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VIEWS, NEWS AND INTERVIEWS.

The Philadelphia *Inquirer* gets its New York news *via* special long-distance telephone.

During the trial of the alleged poisoner, Dr. Henry Meyer, before Recorder Smythe in New York city, Dr. O'Sullivan, the famous doctor-lawyer, brought out the following in his cross-examination of a medical expert witness:

"Are there no diseases that cause death and yet leave no lesions on the organs?" asked Dr. O'Sullivan.

"Yes."

"Tell the jury some."

"That would be pretty hard."

"Is an electric shock one?"

"Yes; an electric shock would produce death without lesions."

"Is an electric shock a disease?" queried Recorder Smythe.

"Oh, I guess so," answered the witness.

The historic Fairfax lands, near Washington, D. C., have been sold for $75,000 to a real estate syndicate. The Arlington Electric Railroad will be extended to the property. The land lies on a beautiful plateau, 200 feet above the river, overlooking the entire city of Washington, and is about a mile west of Fort Meyer.

Charles P. Gaffney, a New York wireman, has been arrested on suspicion of having stolen $8,000 worth of diamonds from a house in which he had been repairing the electric light wires. The electrical business has been very dull during the past year, it is true, but Gaffney might have obtained the value of the diamonds in some other way—by rendering a suitable bill for his work, for instance.

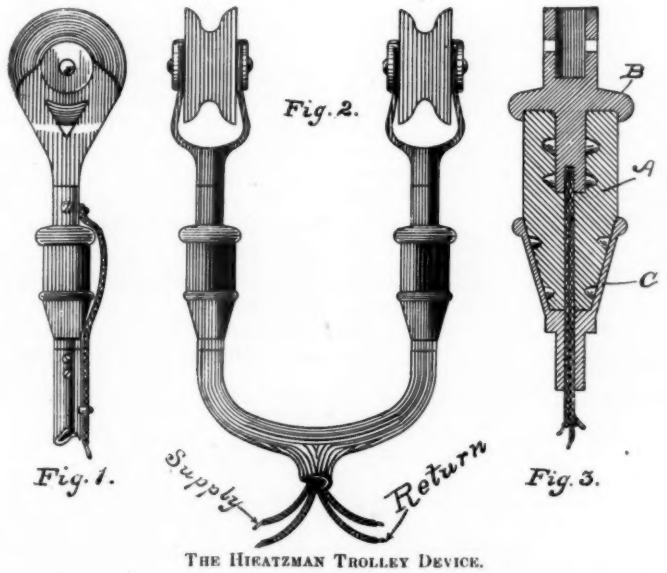
Governor Flower has signed the bill giving a valuable charter and other privileges to the Union Railway Company, of New York city, otherwise known as the "Huckleberry Road." The Governor is reported as saying: "I'll stake not only my political, but my business reputation on the assertion that no charter in New York is so well guarded or so well bottomed to pay revenue to the city as the charter of the 'Huckleberry Road.'" Richard Croker, ex-central power of Tammany Hall, is said to be the largest stockholder in the Union Railway Company which is now operating the only overhead trolley line on Manhattan Island. This is the road on 135th street, which was described in last week's ELECTRICAL REVIEW.

A young man employed by The Hudson River Telephone Company trimmed a lot of handsome Norway spruce trees in Newburg, N. Y., to suit himself and his wires, and a verdict of $1,500 against the company has been awarded the owner.

Captain Millis reports the completion of the telephone line from West Melville, on the Texas and Pacific Railway, to Red River Landing, on the Mississippi River, just below the mouth of Red River. This is an important matter for those interested in the levees. Hitherto there has been no telephone communication along the river front from Bayou Sara to Natchez, and any mishap to the levees along this stretch could not be reported to the levee authorities except after a long delay.

The Hieatzman Trolley Device.

A novelty in electric traction apparatus is the Hieatzman trolley device, which is shown in the illustrations herewith. Fig. 1 is a side view of the upper end of a trolley arm on which is mounted the Hieatzman improvement. Fig. 2 is a front view of the upper end of a single trolley arm provided with this device so as to allow for two independent trolleys on the same arm. Fig. 3 is a vertical section of the device and shows its manner of construction. The device is mounted on the upper end of the trolley arm, between it and the trolley fork and is so made that it can be easily applied without changing the present construction of either the trolley arm or trolley fork. At its lower end the device has a pin for insertion into the present socket on the trolley arm and at its upper end has a socket to receive the pin of the present trolley fork.



THE HIEATZMAN TROLLEY DEVICE.

The device consists of two metal castings, B and C, and an intermediate rubber or insulated block, A. The lower casting is cup-shaped and has small internally projecting studs; the upper casting has a large central stud with small externally projecting studs. Between these two castings is a separating block of vulcanized rubber, in which the small studs of the two castings are embedded; these studs thus form a means of binding the parts together, and also prevent any one of the three parts from turning independent of the others. The insulated wires are carried down along the outside of the trolley arm, Fig. 1, or if desired may be carried down through the device as shown in Fig. 3.

The vulcanized block insulates the trolley from the trolley arm. The trolley arm not being in the circuit and the trolley fork being connected direct, the resistance offered by the many mechanical joints of the trolley base construction is said to be avoided. The device also overcomes the "dazzling blinding flash," which is caused by the arcing between the trolley arm and the trolley or overhead wire, when the trolley wheel inadvertently leaves the wire. The rubber also forms an easy cushion and yet a practically stiff connection between the trolley fork and arm, and it also counteracts the tension of the base springs and causes the trolley wheel to have a smooth gliding movement or contact along the trolley wire, so essential to the perfect operation of the system. The trolley wheel has also a much longer life and the singing, humming noise of the trolley wheel is claimed to be entirely deadened.

This device also serves as a means of construction whereby a single trolley arm can be used to carry two trolley wheels, one for the supply and one for the return, as shown in Fig. 2. From the same figure it will be seen that the trolley arm proper is provided with a fork at its upper end, upon the arms of which the two devices (for a double construction) are mounted, as in the single trolley construction.

The inventor of this device is Mr. A. H. Hieatzman, of Baltimore, Md., who would like to make arrangements with any of the ELECTRICAL REVIEW'S advertisers for the introduction of his invention.

The promoters of the electric railroad between Rockford and Dixon, Ill., have decided to at once construct the road between Oregon and Dixon.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

ELEVENTH ANNUAL GENERAL MEETING AT PHILADELPHIA, MAY 15, 16, 17 AND 18, 1894.

The annual meeting of the Institute will be held at the house of the Engineers' Club, 1122 Girard street, Philadelphia, at 10 A. M., Tuesday, May 15, 1894.

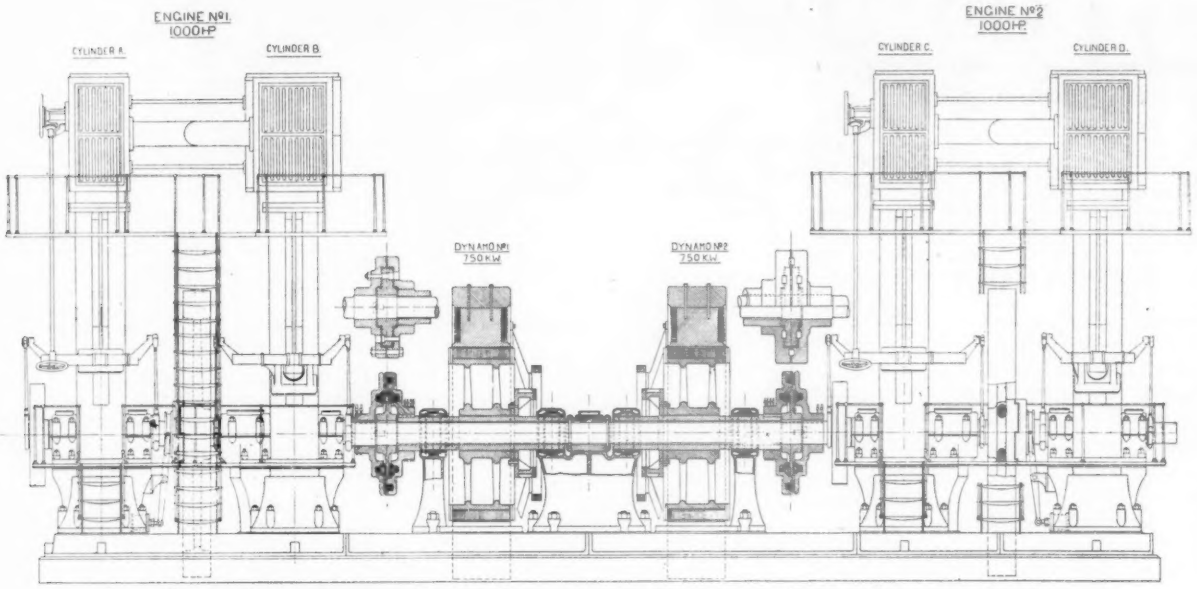


FIG. 1.—ARNOLD SYSTEM OF ELECTRIC POWER STATION CONSTRUCTION, SHOWING CONNECTING JAW CLUTCHES.

Mayor Stuart, of Philadelphia, will deliver an address of welcome to the Institute.

At this meeting the yearly reports will be submitted, officers elected and other business transacted, including action on a resolution favoring legalization of the units adopted at the Chicago Electrical Congress.

TUESDAY, MAY 15.

The opening session of the general meeting for the reading and discussion of papers and reports will begin at 2 P. M.

1. "A Review of the Progress of the American Institute of Electrical Engineers." An address by the president, Prof. Edwin J. Houston, of Philadelphia.

2. "On the Sub-division and Distribution of Artificial Sources of Light," by Prof. Wm. A. Anthony, of Vineland, N. J.

3. "Discriminating Lightning Arresters and Recent Progress in Means for Protection against Lightning," by Alexander Jay Wurts, of Pittsburgh. Experimental demonstrations will be shown through the courtesy of the Philadelphia Traction Company.

A reception will be given in the evening by the engineers and manufacturers of Philadelphia, under the auspices of the "Engineers Club" and the "Electrical Section of the Franklin Institute."

WEDNESDAY, MAY 16, MORNING SESSION.

4. "Some Storage Battery Phenomena," by Mr. W. W. Griscom, of Haverford, Pa.

5. "Unipolar Dynamos for Electric Light and Power," by Prof. Francis B. Crocker and Mr. C. Howard Parmly, of New York city.

6. "Alternating Currents and Fuse Wires," by Prof. Dugald C. Jackson and Mr. R. J. Ochsner, of Madison, Wis.

Intermission.

AFTERNOON SESSION.

7. "Test of Closed Coil Arc Dynamo," by Prof. R. B. Owens, of Lincoln, Neb.

8. "Relative Advantages of Toothed and Smooth Core Armatures," by Mr. Alton D. Adams, of Worcester, Mass.

9. "Central Station Economy," by Mr. C. Reginald Van Trump, of Wilmington, Del.

In the evening the annual dinner will be served at the Hotel Metropole, the price of which has been fixed at $2.50 per plate. This will be a purely social gathering. Friends may be invited.

A theatre party for the ladies will also be organized in the evening.

THURSDAY, MAY 17, MORNING SESSION.

10. "The Waste of Zinc in Open Circuit Batteries when Standing Idle," by Mr. Henry A. Lardner, of Madison, Wis.

11. "Standardizing Electrical Measuring Instruments: (*a*) by the Potentiometer Method; (*b*) an Improved Direct Reading Potentiometer," by Mr. Elmer G. Willyoung, of Philadelphia.

12. "An Optical Phase Indicator and Synchronizer," by Prof. George S. Moler and Dr. Frederick Bedell, of Ithaca, N. Y.

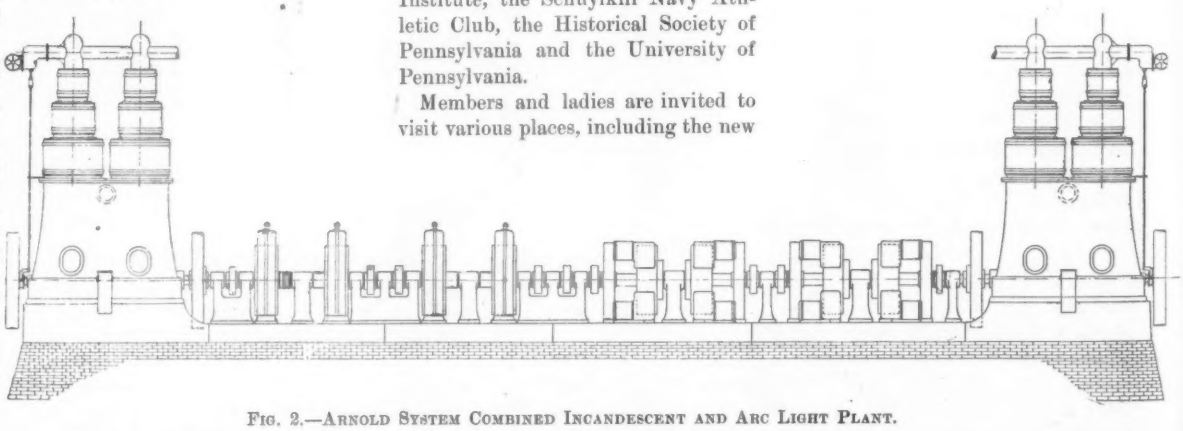


FIG. 2.—ARNOLD SYSTEM COMBINED INCANDESCENT AND ARC LIGHT PLANT.

13. "A New Method of Recording any Kind of Variable Current," by Prof. Albert C. Crehore, of Hanover, N. H.

Thursday afternoon will be devoted to an inspection of Cramp's Shipyard, followed by an excursion down the river to Gloucester, where a shad dinner will be served.

While the members are visiting the shipyard Thursday afternoon, the Manufacturers' Club will entertain the ladies at the club house, followed by a "tallyho excursion" to points of interest in and about the city.

FRIDAY, MAY 18, MORNING SESSION.

14. "Resonance Analysis of Alternating and Polyphase Currents," by Prof. M. I. Pupin, of New York city.

15. "Some Facts about Polyphase Motors," by Dr. Louis Bell, of Boston.

16. "The Law of Hysteresis (Part 3) and the Calculation of Ferric Inductances," by Mr. Charles Proteus Steinmetz, of Schenectady, N. Y.

17. "Experiments with Two Phase Motors," by Dr. Louis Duncan, of Baltimore.

Adjournment.

The arrangement of papers in this programme is subject to change, as may be found necessary during the progress of meeting.

All who are interested in electrical progress are invited to attend the sessions, whether members or not.

Members and guests are requested to register at the secretary's headquarters, Engineers' Club, 1122 Girard street.

In addition to the facilities kindly offered by the Engineers' Club, invitations have been extended to members of the Institute, to avail themselves of the privileges of the Franklin Institute, the Schuylkill Navy Athletic Club, the Historical Society of Pennsylvania and the University of Pennsylvania.

Members and ladies are invited to visit various places, including the new power station of the Philadelphia Traction Company, the Edison Electric Light Station, factory of Chloride Accumulator Company, plant of Germantown Electric Light Company (with large storage battery plant), etc.

The tallyho excursion and the theatre party have been provided through the courtesy of the friends of the Institute in Philadelphia more especially for the entertainment of the ladies, who it is hoped will join in making the tenth anniversary of the Institute a memorable occasion.

The Arnold System of Electric Power Station Construction.

The Arnold system is one which combines the flexibility of the low speed, or large engine belted plant, with the low first cost of the direct connected or direct belted plant. The advantages claimed for this system are as follows:

First, less cost per kilowatt of plant installed; less cost in operating expenses; less real estate occupied; absolute flexibility; less depreciation and greater ease in handling than is usual in power plant heretofore installed. The system is described as applied to an electric railway plant having a capacity of 2,000 horse-power.

Referring to Figs. 1 and 3, engines No. 1 and No. 2, are two cross compound condensing engines, having a rated capacity of 1,000 horse-power each. Generators No. 1 and No. 2 have a rated capacity of 750 kilowatts each.

The armatures of the generators are mounted upon hollow cast-steel shafts or quills, Cc, running in independent bearings, Pp, so arranged that they are free to revolve independent of either engine and of each other. Through these quills and supported at its center by bearing D extends a steel or wrought-iron shaft, carrying upon its ends circular cast-steel or cast-iron disks, Ff, securely keyed to the shaft.

The drawing shows the engines connected to generators with magnetic clutches which operate as follows: Attached to the end of the engine shafts, Aa, are circular cast-iron or cast-steel disks, Hh, carrying in recesses copper coil, Oo, which are connected to brushes, Qq, by means of rings, Rr, in such a manner as to permit a current of electricity to be passed through the coils while the disks are in motion. Around the vertical face of disks, Hh, near the peripheries are carried cast-steel or cast-iron rings, Ii, which are held in position on disks, Hh, by means of three gudgeons or bolts, equally spaced around the periphery of disks, Hh. Rings Ii are normally held against disks Hh, by small spiral springs surrounding the gudgeons or pins. Attached to quills Cc are cast-iron or cast-steel disks Jj, carrying two coils of copper wire Mm, Nn, which are connected to brushes Kk, so as to allow a current to be passed through the coils when the disks are in motion. If a current of electricity is passed through the coil M a magnetic field will be created around it which will have a tendency to attract disk I, overcoming the action of the springs which normally hold it against disk H, and clamping it securely to disk I, so that power can be transmitted from one disk to the other by friction so long as the current travels

through coils M. If engine No. 1 now be set in motion it will drive generator No. 1 directly connected, there being no wearing parts except what are ordinarily encountered in a direct connected engine and dynamo plant. In a like manner engine No. 2 can be connected to generator No. 2, thus forming two direct connected power units.

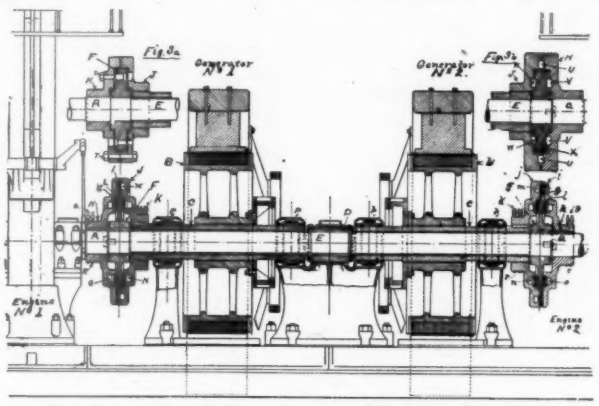


FIG. 3.—ARNOLD SYSTEM, SHOWING MAGNETIC CLUTCHES.

Shaft E lies idle in bearing D, and is not used except in case it becomes necessary to drive either generator from the opposite engine, or both generators from the same engine. In case the engine of one unit and the generator of the other unit should become disabled, this system would operate as follows:

If engine No. 1 and generator No. 2 were the disabled portions of the plant, generator No. 1 would be driven from engine No. 2 as follows: Current would be passed through coil *o*, thereby attracting disk *l* which would set shaft E in motion. Current would also be passed through coil N attracting disk L, which would set the armature of generator No. 1 in motion. Current is then cut off from coil M, allowing the armature or generator No. 2 to come to rest. It will be readily understood that either generator can be reached from either engine in a like manner, thus making it practically interchangeable.

Should one entire engine unit become disabled, both generators can be driven from either engine by simply passing the current through the proper coils as follows:

If engine No. 2 were disabled, generator No. 1 would be driven direct from engine No. 1 by means of coils M and disk I, as above described. Current would be passed through coil N, thus attracting disk L and setting shaft E in motion. Current would then be passed through coil *n* attracting disk *g*, thus setting disk *j* of generator No. 2 in motion. Either generator or both generators are thus available from either engine.

The fact of having to work the engine uneconomically while repairs are being made, is a very small item compared with the heavy expense of carrying an additional investment of a third engine and generator to provide for this emergency, as is now usually done with direct-coupled plants.

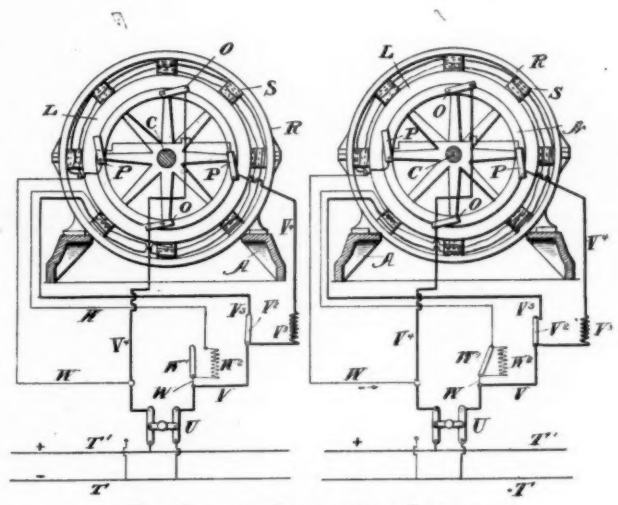
By having two engines with the high pressure cylinder of one and the low pressure of the other direct-connected to the work, the plant is arranged to operate economically with any load varying from 500 to 2,000 horse-power, and it is practically impossible to shut the plant down on account of any accident that would be liable to happen.

It will be noticed from Fig. 1 that the main shaft of both engines is cut in the middle and the two parts joined together by means of positive jaw clutches operated by steam cylinders. Thus when the load is light, say from 12 o'clock to morning on an elevated road, engine and generator No. 1 are shut down. Cylinder D of engine No. 2 is cut off by means of the jaw clutch, and no portion of the plant operates except the high pressure cylinder of engine No. 2 directly coupled to generator No. 2. This cylinder can be run condensing and the plant operated with economy until the road requires more power, when the low pressure cylinder is brought up to speed and connected in with the high pressure cylinder without stopping the plant.

In case it becomes necessary to make repairs on the high pressure cylinder of engine No. 2 at the same time that the road is demanding full power of engine No. 1, high pressure steam may be admitted to the low pressure cylinder of engine No. 1, which will be noticed from Fig. 1 is placed next to the generator. By working high pressure steam in the low pressure cylinder of this engine it will give its full power, thus driving its generator and allowing the high pressure side to be shut down for adjustment.

In order to prevent wear on the rings of the magnetic clutches above described, the following method of electrically starting the generators is covered under this system: Suppose engine No. 1 and its generator are operating and engine No. 2 and its generator are standing idle, and it becomes necessary to throw generator No. 2 upon engine No. 1 in order to repair something on generator No. 1. Instead of starting engine No. 2 to bring generator No. 2 up to speed, or allowing the friction of the magnetic clutch to bring the latter up to speed, the following method is adopted. Current being produced from generator No. 1 is passed through the armature and fields of generator No. 2 in such a manner as to make a motor of it until the armature attains the same speed as that of generator No. 1, when current is passed through coil N clamping disk *f* to disk J without wear on the clutch mechanism.

Figs. 4 and 5 are diagrammatic representations of the circuits for operating the machines as motors and generators. Referring to Fig. 4, if generator No. 1 is running as a generator from engine No. 1, the circuit is as follows: From the positive bus-wire on the switchboard T1, through the double pole switch U, conductor V4, brushes OO, armature L, to brushes PP, to field magnet coils SS, conductor V5, switch V2 and conductor V, to switch U, back to the other main conductor T. This machine is therefore supplying the main conductor with current. By disposing the parts as indicated in Fig. 5, the circuits will be varied so that the circuit of conductor V includes at first the high variable resistance V3,



FIGS. 4 AND 5.—DIAGRAMMATIC CIRCUITS.

and excludes the series winding of the field magnet, and the shunt circuit excludes the resistance W2 by means of switch W1, so a variable current may be made to pass through the armature by varying the resistance V3. Thus the machine operates as a shunt motor and its sleeve shaft is driven at any desired rate of speed by simply adjusting the resistance V3. The rotation of the sleeve shaft will vary from the rotation of the main shaft, and when the armature of machine No. 2 has attained approximately the same speed as the shaft E, the magnetic clutch is thrown in circuit, the proper switches are thrown, and generator No. 2 ceases to be a motor and becomes a generator capable of producing current.

In case it ever becomes necessary to increase the capacity of the power station designed under this system, it is done by adding two more generators to the right of engine No. 2, as shown in Fig. 6, having similar connections to generators Nos. 1 and 2, thus making four generators available from engine No. 2. The third engine is added as the power is required.

Figs. 3*a* and 3*b* show different forms of mechanical clutches, which can be substituted for the magnetic clutches above described if necessary. In a railway plant the fact of having to stop the station for a few minutes at the time of changing from one engine to another is not so serious as in a lighting plant, and the above clutches have been designed for substitution for the magnetic clutches in case the conditions were such as not to warrant installing the magnetic clutches.

In Fig. 3*a* (see Fig. 3) H is a disk securely keyed to engine shaft A of engine No. 1; J is a circular disk securely keyed to quill C of generator No. 1; F is a circular disk keyed to the common shaft E. If it is desired to drive generator No. 1, three bolts, T, spaced equi-distant on the circumference are used to bolt disks H and J rigidly together, the same as cable railway plants are now operated. Engine No. 1 is thus driving generator No. 1 directly connected without any wearing parts except the bearings of the two machines. In case it becomes necessary to drive generator No. 2 from engine No. 2, bolts S are inserted as shown, thus rigidly connecting disk H to disk F and revolving shaft E. Bolts S can be reversed so that disk F will be rigidly bolted to disk J, permitting shaft E to drive generator No. 1 from engine No. 2, thus performing all the functions of the magnetic clutch as described above.

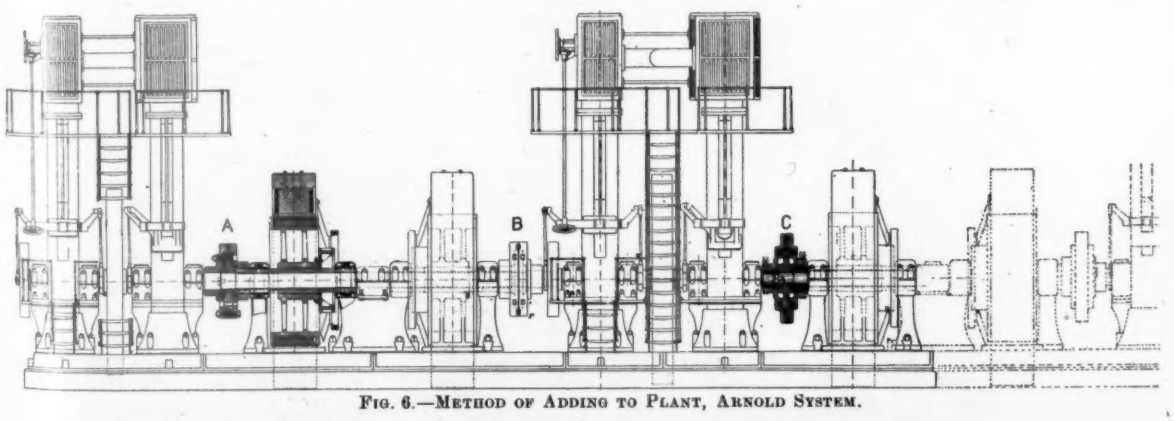


FIG. 6.—METHOD OF ADDING TO PLANT, ARNOLD SYSTEM.

Fig. 3*b* (see Fig. 3) is another form of clutch now commonly used in cable railway plants. Disks H and J are keyed to the engine and generator shafts respectively, and disk X is keyed to shaft E. If it is desired to drive generator No. 2 from engine No. 2, two steel or wrought iron keys are inserted in recesses UU, thus rigidly connecting the disk H to disk J.

By inserting the wedges in recesses VV shaft E is made to revolve from engine No. 2, and by inserting the wedges in recesses WW generator No. 2 is caused to revolve from shaft E, thus making the plant interchangeable in all directions.

The entire plant is mounted upon cast-iron bed-plate construction, cast in sections and thoroughly anchored, the same as first-class cable railway power station construction of the present day.

THE BLACKENING OF INCANDESCENT LAMPS.

BY PROF. WM. LISPENARD ROBB.

As a part of the discussion of Prof. William A. Anthony's paper on the "Effect of Heavy Gases in the Chamber of an Incandescent Lamp," read before the American Institute of Electrical Engineers, the following opinions were expressed by Prof. Wm. Lispenard Robb, of Hartford, Conn.:

I have been more and more impressed of late with the great need of a lamp of constant efficiency, rather than of a lamp of high initial, but constantly decreasing, efficiency. All the work of manufacturers of late seems to have been devoted to getting lamps of as high initial efficiency as possible, and consequently, we have lamps whose candle-power decreases very appreciably from week to week, and month to month. Now, in a large room, that does not cause any very great difficulty, because after the service has been going on for some time there will be a continual renewal of lamps, and we will soon get into a condition where we will have an average amount of light in the room. But in the application of electricity to house lighting, where we have from one to four lamps in a room, it is a cause of great annoyance to have lamps, which, at the beginning of the month give out 16 candle-power, and at the end of six weeks or two months give 12 candle-power. Professor Anthony seems to have pointed out a way to overcome this difficulty. I confess the first lamp I ever saw of the Waring company's manufacture rather prejudiced me against the lamps. I remember having a few submitted to me by the Hartford Electric Light Company for test, and finding that they required about 4.5 watts per candle power. That was at the time when the Waring Electric Company was using filaments which were manufactured for use in high vacuum lamps. Before shutting down they were manufacturing lamps which had comparatively high efficiencies. I have never seen before the result of any test of Waring lamps made under normal conditions, but they evidently coincide with what was expected from the tests which various electricians have made of the lamp under forced conditions. There is, however, a certain value to be attached to those tests under forced conditions. As is well known the deterioration in candle-power of an incandescent lamp is very different on a commercial circuit from what it is in an ordinary test on a battery. The deterioration is caused to a great extent by the abnormally high voltages which are furnished by nearly all commercial companies at certain times, and the forced tests certainly show the advantage of bromine lamps in withstanding this hard usage.

I fully agree with Professor Anthony in his opinion that the blackening of the bulb is chiefly due to the evaporation of the carbon. We have three theories put forward to explain the wasting away of the carbon and the consequent blackening of the lamp. We have the air-washing theory, what we might call the Crookes effect theory, and the theory of simple ordinary evaporation. Now it seems to me, if it is an air-washing phenomenon, due to convection currents, this air-washing must be nearly proportional to the temperature of the filament. If it is an electrical phenomenon it must be approximately proportional to the voltage at which the lamp runs. Now what do we find? The most complete tests that I am acquainted with in regard to the efficiency of electric lamps are an exhaustive set of tests which were made at Zurich, by Prof. H. F. Weber, to whom we are indebted for those extremely valuable tests of the efficiency of the Frankfort-Lauffen transmission plant. I selected at random a test of what he denominates the newest Edison lamp. The lamp was marked 16 candle-power at 100 volts. He states that at 100 volts and a fraction, it gave 16 candle-power with an efficiency of 3.04 watts per candle-power and that the filament was at a temperature of 1.573 degrees centigrade. At 108 volts and a fraction he gives the candle-power as 25.8, the efficiency as 2.25 watts per candle-power and the temperature as 1.610 degrees centigrade. Now we have there a difference in voltage of 8 volts and a difference in temperature of 37 degrees. Now it seems to me that a difference in temperature of 37 degrees in that part of the scale, that is from 1.573 to 1.610, would not produce any great difference in air-washing—anything like enough to account for the difference in the rate of blackening of the bulb of the lamp when run at those two different efficiencies, at three watts per candle-power and at two and one-quarter watts per candle-power. Nor could a difference of eight volts, from 100 to 108 volts, cause sufficient difference in the rate of blackening. But it seems to me that the rate of evaporation at those two different temperatures could be very different. If we consider the evaporation of ice, or what bears more fully on this subject than any other research I know of, one by Professors Ramsay and Young on rate of evaporation of camphor under different pressures and at different temperatures—we will find that a very slight difference in the pressure, or a very slight difference in the temperature, when you are at a certain point on the scale can cause a very great difference in the rate of evaporation. It seems to me, therefore, that of the three explanations, that is, air-washing, the Crookes effect and evaporation, the theory of the wearing away of the carbon by evaporation pure and simple is the one which is most in accordance with the experimental facts.

A TROLLEY CAR IN THE PARLOR.

PECULIAR ACCIDENT ATTENDED WITH NOVEL INCIDENTS AT BALTIMORE.

A steep grade ending at a short curve, a broken trolley wire, a stunned motorman, a wrecked trolley car, a badly damaged dwelling and a suit for damages filed within four hours were the circumstances that formed an interesting and exciting accident at Baltimore on Tuesday morning, May 8, at 7.20 o'clock. Car 28, of the Central Electric Railway Line, in charge of Motorman John Kavanaugh, started down a grade on Lanvale street. The grade ends in a curve at Myrtle street. Just as the car started the trolley wire broke and falling on Motorman Kavanaugh shocked him so severely as to prevent his using the brake. The car rushed down the Lanvale street grade at a high rate of speed, jumped the curve and crashed into the house of Mrs. Golder, on Myrtle street.

PECULIAR TROLLEY ACCIDENT AT BALTIMORE.

According to the Baltimore *American*, Miss Golder saw the car coming from a window in the third story, but was too startled to move or give an alarm.

The bumper broke clear into the side of the wall, as did also the top of the car, causing the wall to bulge like a balloon. The bumper in striking the wall was elevated, which caused the entire front of the house to rest upon its support almost entirely.

Superintendent Hopps, of the railway, came in quick response to a call for aid, and with a corps of men began to extricate the car. Carpenters and masons were called by President Blakistone to repair the damages done to the house, but it was found that the immediate removal of the car, so great was the weight resting entirely on the bumper, might cause irreparable injury to the wall. In the cellar of the house a great lot of plaster and loose bricks were shaken. The front brakes on the car were badly damaged, while the top was crushed and bent out of shape. The damage to the car was $250.

President Blakistone claims that in law this peculiar accident is denominated as unavoidable. Cars coming down such steep inclines are liable to leave their tracks, while a trolley wire will break despite the most vigilant care. He said, however, that every reparation possible would be made to the owners of the house.

Mrs. Golder, however, entered suit before noon against the Central Railway Company for $2,000 damages for destruction of her property. This is one of the quickest suits on record following a cause for damages.

Western Union Telegraph Company and Green Goods Men.

The Hudson County, N. J., Grand Jury made a strong presentment last week against the Western Union Telegraph Company for its alleged collusion with "green goods" swindlers. An indictment would have been found had not the law been defective. All that the Grand Jury could do under the circumstances was to express its opinion in the presentment. The swindlers engaged in the green goods business, after having been ordered out of Jersey City by the police authorities, established their headquarters in New York. From that city and other Eastern cities they mail their circulars broadcast over the entire country, and in these circulars they give as their addresses, at which their victims may communicate with them, certain street numbers in Jersey City, which either have no existence or are occupied by factories and railroad yards. After the swindlers have sent out their circulars with these addresses all further communications between them and their victims are carried on by telegraph. A great number of telegrams from the victims to the swindlers are received at the main office of the Western Union Telegraph Company at Jersey City, of which John B. Bartholf is manager. The dispatches are directed to fictitious addresses, as heretofore explained; but, according to the presentment, by an arrangement between the green goods operators and the representatives of the Western Union Telegraph Company, and with full knowledge on the part of the representatives of the company as to the character and purpose of such dispatches, the messages are not delivered at the addresses to which they are directed, but are sent by representatives of the company, by special messengers, to the real headquarters of the swindlers in New York.

Ex-Assemblyman James J. Davidson, of Swedesboro, is negotiating with the Gloucester and Salem Turnpike Company for a right of way for the Camden, Gloucester and Woodbury, N. J., Electric Railway. Should favorable arrangements be made the trolley would in all probability be extended to Clarksboro, Mullica Hill and Swedesboro. It would then be but a short distance to Woodstown and Salem.

TELEPHONE NEWS AND COMMENT.

President Henry Metzger, the well-known telephone official of Pittsburgh, paid the REVIEW a pleasant call last week. The telephone business in his territory is improving.

The Western Telephone Construction Company, of Chicago, has certified to an increase in capital stock from $1,000,000 to $3,000,000; also increasing the board of directors from four to seven.

A new telephone company, the Eastern, has been granted a franchise in Brooklyn, N. Y. It does not seem to be strongly backed, and the restrictions under which the charter is secured are not of a nature to attract investment.

A special meeting of the Southern Massachusetts Telephone Company has been called for the purpose of increasing the capital stock. The increase will probably be $100,000. This will make the full capital $600,000.

The officials of the New York and New Jersey Telephone Company state that they have not decided that their Jersey City operators shall wear black dresses and lunch at Central. They only prefer this as an advantage to the service in the matter of time, convenience and neatness.

The Mexican Telephone Company's stockholders held their annual meeting in New York city on May 9. President Robert Colgate presided and James Cooney, Jr., acted as secretary. A committee of three was appointed to report at a future meeting some plan for reorganization. The names of the directors for the ensuing year are: Robert Colgate, Ezra H. Baker, Orrando P. Dexter, Robert Bacon, William A. Paine, W. French Smith and James H. Dawes.

The Gilliland Telephone Company.

The Gilliland Telephone Company has been organized under the laws of Illinois with a capital stock of $1,000,000. Mr. E. T. Gilliland, one of the ablest electricians of the day, is the inventor of the system, and associated with him is Mr. Wm. H. McKinlock, president of the Metropolitan Electric Company, of Chicago, and other experienced electrical gentlemen. This gives the Gilliland Telephone Company an electrical and commercial standing second to none outside of the American Bell Company, and even this company may soon have to look to its laurels, particularly in several branches of the telephone business.

The general offices of the new company will be at 186–188 Fifth avenue, Chicago, and the large factory of the Gilliland Electrical Company, at Adrian, Mich., will be devoted to the manufacture of these instruments.

The telephone of this company is adapted to exchange work as well as private lines, and is a magneto system requiring no battery. The transmitter is adjustable and can be adapted to the height of the user. The chief business of the company will be manufacturing non-infringing apparatus for telephone work generally.

There will undoubtedly be a large demand for the Gilliland instruments.

Electric Launches on Boston Park Lakes.

Gen. C. H. Barney, who was general manager of the Electric Launch and Navigation Company's fleet of electric launches at the World's Fair, and who is well known in the electrical field, especially among old telephone men, has secured a five years' exclusive franchise from the Park Commissioners of Boston, to furnish transportation by boats on the waterways of all of Boston's parks. A number of electric launches will be used, besides rowboats, sailboats and canoes, and it is expected that Boston will have the finest service of this kind of any city in the world.

Rapid Transit in Boston.

The Hon. E. Moody Boynton arrived in Boston a few days ago from his farm at West Newbury, Mass., and stayed long enough to give his views on the subject of rapid transit for Boston, which at the present time is the all absorbing topic. If any place on earth ever needed rapid transit of some kind, that place is Boston; and now that the subject is receiving something in the way of serious consideration, the public may be forgiven for their strong feeling on the subject, and their impatience to have some system, even if not absolutely the best, adopted, and adopted quickly.

Boston is still, in many respects, nothing more than a great overgrown village, and in nothing is this fact more noticeable than in its transportation facilities. The West End Street Railway Company is a great corporation, and is doing what it can, but its best efforts are entirely inadequate to the needs of the public, whose only fault is that they have for so long a time submitted to the wretched accommodations furnished them.

Boston streets are full of cars, in some places altogether too full, yet it is no unusual thing for a would-be passenger to stand on a corner for twenty minutes or half-an-hour waiting for the particular car he wants, and when it finally comes along, nine times out of ten it is packed to the doors, and he must either hang on where he can or walk, as the next one will present the same conditions.

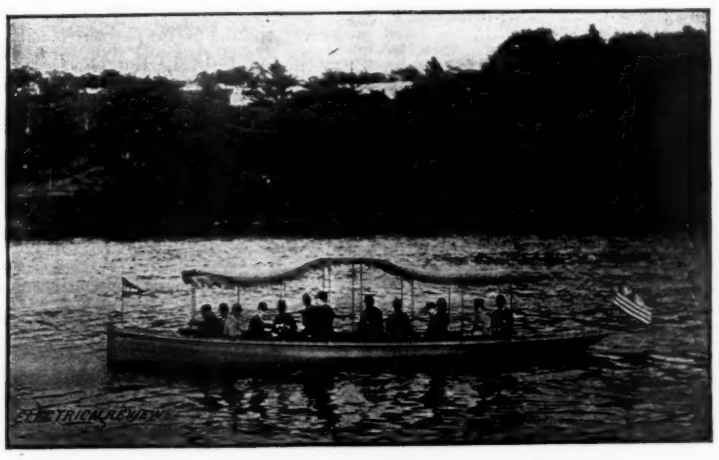
Twenty minutes headway may answer for some surburban huckleberry line, but it is hardly suitable to the needs of a large city.

The subway scheme has been discussed in every conceivable form, but aside from the vast expense of construction, and the time it would require to complete it, there are grave doubts as to whether, after all, it would accomplish the desired end.

An elevated system operated by electricity is what the city needs, and in fact, it is the only feasible means of furnishing anything worthy of the name of rapid transit. Mr. Boynton does not think much of the Meigs system, about which so much has been said recently, but claims that by means of his bicycle electric road the country within a radius of 50 miles could be opened up and over 2,000,000 people brought within 30 minutes of the center of the city by means of swift and noiseless trains.

This may or may not be so, but even a small percentage of such results would be a great improvement over the present state of affairs. Boston is noted for its beautiful suburbs, and the great majority of the population is scattered among them. A system of rapid transit that would put these people within easy reach of the heart of the city is what is needed, and what must come sooner or later, and the sooner the better.

H. G. T.



ONE OF THE WORLD'S FAIR ELECTRIC LAUNCHES WHICH WILL BE USED ON THE BOSTON PARK LAKES.

Woven Wire Dynamo Brush Patents.

The woven wire dynamo brush, described in the ELECTRICAL REVIEW for April 4, 1894, is covered by the broad fundamental patents No. 410,265, of September 3, 1889, and No. 457,327 of August 4, 1891 owned by the General Electric Company. These patents are claimed to cover all forms of woven wire dynamo brushes.

International League of Press Clubs.

The Convention of the International League of Press Clubs in Atlanta, Ga., the first week in May, gave the hospitable people of that section an opportunity to extend a warm and sincere welcome to the newspaper representatives of the North. The trip was made in a special train, starting over the Pennsylvania system, which company's representative, Mr. Purdy, remained with the party for the entire trip of over 3,000 miles, and his experienced guiding hand made the trip most thoroughly enjoyable.

Col. B. W. Wren, of the Eastern Tennessee system, one of the most popular railroad men of the South, took charge of the party over several Southern lines, and Mr. Emerson, of the Atlantic Coast Line, also assisted in the transportation and entertainment.

There were about 100 representatives of the Press Clubs of the United States and receptions were extended them in the large cities through which they passed, including Philadelphia, Harrisburg, Pittsburgh, Columbus, Cincinnati and Chattanooga. The party lunched on Missionary Ridge battlefield, near Chattanooga, and breakfasted on Lookout Mountain. At Atlanta a number of delightful receptions were extended to the party, and President Joel Hurt, of the electric railway system, gave a delightful ride in his commodious cars all over the city and suburbs of growing Atlanta. A number of the visitors were also shown the handsome new building of the Southern Bell Telephone Company, the visitors remarking the complete facilities for comfort and convenience of the operators. Superintendent Easterlin and Manager Gentry were very courteous in their welcome to the northern guests. An old-fashioned Georgia barbecue, given at Stone Mountain by the enterprising Venable Brothers, was the most unique feature of the trip. The Brunswick stew of the barbecue, on which 1,000 pounds of red pepper had been expended, proved a great delicacy and will long be remembered by the newspaper workers as a good thirst provider.

From Atlanta a flying trip was made to St. Augustine, Fla., the special train returning by way of Savannah, Charleston and Richmond, a reception being given to the visitors in each city. At Charleston, through the kindness of Mr. Emerson, a boat ride around Fort Sumter was keenly enjoyed.

The League elected Mr. Clark Howell president, Mr. Murat Halstead vice-president, and retained Col. John A. Cockerill on the governing board. A good deal of business looking to the increase of membership, furthering the Home for Aged and Infirm Journalists, etc., was transacted. The Convention marched in a body to the monument of Henry W. Grady, where Col. Cockerill deposited a beautiful wreath of flowers as an evidence of the respect and esteem in which Mr. Grady had been held by the newspaper people of the country.

The next Convention will be held in Philadelphia, in June, 1895.

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The annual report of the Westinghouse Electric and Manufacturing Company is published in full on another page and comment on it may be found in our Wall street news on the opposite page.

Experiments are about to be made with electric traction in Berlin, by the Berlin Horse Street Railway Company. The accumulator system is the one to be tried, a charging station having just been completed and equipped. The result of this trial will be watched with interest.

The feature of greatest electrical interest this week is the annual and general meeting of the American Institute of Electrical Engineers at Philadelphia. Judging from the programme which is published in full elsewhere in this issue the meeting should be most successful both from a technical and social standpoint.

A good point to consider in contemplating the many new telephone manufacturing companies is whether they have stock or apparatus for sale. As a corollary, if stock is for sale examine carefully the apparatus; if apparatus is for sale, scrutinize the value of the stock.

Does it not seem inviting to strive for the amorphization of carbon by electric heat or some analogous process, and thus perhaps produce a sort of bort or black diamond? It would pay if successful, and there are thousands of men who have command, at will, of heavy currents for such experiments.

Successful experiments were made last week in lighting by electricity the cable cars on the Brooklyn Bridge. The system used was a dynamo driven from the car axle and storage batteries to supply current when the car is standing still. There is no reason why such a scheme should not be feasible on any steam or cable car. The Manhattan Railway Company, of New York city, would receive the hearty thanks of its patrons if such a method of lighting the elevated cars were adopted. The present oil lamps are malodorous, insufficient, unhealthful generators of heat, and altogether unbearable.

THE BUSINESS SITUATION.

The electrical business, like many other manufacturing industries, has about reached that point where the margin of profit is such that an increased production and a wider market are necessary before large dividends can be earned. The cost of manufacturing the product for the present market is in many cases as low as is consistent with salable quality and can be still further reduced only by increasing the quantity. Beginning two years ago there has been a steady reduction in prices on electrical apparatus and this reduction has not been balanced by a sufficiently increasing market, partly due to the depression in business during the last nine months. We all look forward to a lifting of this depression during which prices have been so badly cut; but the Summer will pass before an appreciable increase in business can be noted and then the growth will be gradual. Electrical manufacturers should prepare for the revival of trade by doing all they can to make a wider market for their product, for it is certain that the revival will not be sudden enough or strong enough to stand the prices of two years, or even one year ago.

THE PRIMARY BATTERY.

We believe it was Professor Tyndall who made the striking assertion that, from the standpoint of locked-up energy, if we take a gun-cap for the cell, a tear for the electrolyte and suitable electrodes, the total energy, if gathered, would make a pretty good thunder storm. If this could be even in a remote degree approached by any practicable form of battery, aerial ships might soon be known to commerce. And why should not the missing link be discovered? There has been great work done by investigators in the past on the production of electricity from primaries batteries, and there has been a vast amount of swindling accomplished by scientific fakirs along this same line. But is the primary battery question after all anywhere near a solution? Has it ever been the subject of the merciless rasp of scientific law and requirement that has torn the jagged edges and corners off the once nearly unrecognizable dynamo? Has not a great proportion of the so-called "improving" been done by kitchen-chemists and back-yard electricians? Much has been said and written on the necessity for zinc as the combustible element, simply because experimenters have found it to be so with the combinations tested. But years of constant investigation and testing by a hundred experimenters would not begin to run the gamut of possibilities on the electro-chemical scale. There is hope, certainly, and there is plenty of room for an honest, efficient and easily maintained primary battery.

The Arnold system of electric power station construction is fully illustrated and described in this issue of the ELECTRICAL REVIEW. The inventor, who obtained a patent on the system on April 10, 1894, is Mr. Bion J. Arnold, of Chicago, who will be remembered as the electrical engineer of the Intramural Elevated Electric Road at the World's Fair. He claims that if a cable railway can be driven with absolute reliability, flexibility and economy, from two units of power, there is no reason why an electric railway should not be driven with the same degree of reliability, flexibility and economy, from the same number of units of power, that is, two.

The continued strike of operatives in the coal regions is beginning to have an effect on the fuel supply of central electric lighting stations. Unless relief comes soon many plants will be obliged to shut down for want of coal.

CORRESPONDENCE.

OUR CHICAGO LETTER.

Mr. Frederick Sargent has received an offer, it is rumored, to design engines for the Cramp Shipbuilding Company, and may move East.

Taylor, Dee & Mack concluded that the condition of trade had improved sufficiently to warrant their moving into more attractive and convenient quarters. So they rented the store room at 320 Dearborn street and moved a block north.

The Union Electric Company in which Mr. Charles H. Aldrich, Home Insurance building, is interested, expect to again be in the market with the Crowdus primary cell, and it is understood have perfected arrangements with the owner of the patents to continue the manufacture of these cells on a royalty. Mr. Aldrich is also endeavoring to interest additional capital.

Mr. James R. Chapin, at present the general manager of the street railway lines in Grand Rapids, is coming to Chicago to have full charge of the electric construction and the management of the electric lines of both the north and west side companies. Mr. Yerkes has displayed excellent judgment in the selection of so discreet and capable a manager, and there is little doubt that the lines will be constructed rapidly, economically, substantially.

N. W. Harris & Company in commenting on the competition for municipal bond issues mention that Indianapolis recently asked for bids on three million four per cents, and the successful bidder secured them at 103.31, or on a basis of 3.81 per cent. Four months ago these same bonds could have been bought at par. The city of Allegheny also called for bids for $300,000 twenty year 4s recently, for which there were 19 bidders, and 105 was the successful bid.

Few men have had the extended experience or made as close a study of the best method of illuminating retail clothing, dry-goods and department stores that Mr. D. P. Perry has had, and to this practical work must be credited the excellent success he has met with in securing the contracts for the complete installations in large department stores like The Fair, or Frank's; or dry-goods houses like Carson, Pirie, Scott & Company, or Schlesinger & Mayer; or clothing houses like The Hub. All of these places are located on State street in the heart of the retail section of Chicago, and in each there is a constant throng wending in and out from eight o'clock in the morning till six o'clock at night. To carbon the lamps during the daytime would not only be practically impossible, but were it done would cause endless confusion. Therefore, it was necessary to secure a lamp that would burn for 12 hours without retrimming. In each place Mr. Perry's company installed the Standard dynamo and the Standard single lamp, using elliptical carbons. The best indorsement of the efficiency of the service is shown in one company contemplating an addition of 400 lamps to its present equipment of 600 Standards.

F. De L.

Chicago, May 12, 1894.

The Harrison Telephone Patents.

The Harrison International Telephone Company have consulted a number of eminent attorneys on the validity of the Harrison telephone and the Ford automatic switchboard patents. Witter & Kenyon, of this city, have rendered a long opinion of which the following is a part:

In our opinion your telephone does not infringe that patent nor any of its claims, and can be made and used without regard to that patent, whatever be its fate in the pending government suit to repeal it.

The Berliner patent only covers the use of electrodes that are in constant contact and that operate by variations of the pressure of contact. Your telephone operates by a making and breaking of contact: its electrodes are not in constant contact. The Berliner, like the Bell telephone, throws upon the line wire an undulatory current. Your telephone throws upon the line wire a pulsatory current. Such a pulsatory current was not covered by the Bell telephone patent of 1876, and the United States Supreme Court so decided in the telephone cases. The Berliner patent is no broader in this regard than the Bell patent was. The method of operation of your telephone is thus substantially different from that of the Bell and Berliner telephones. This fundamental difference was, as we understand it, the ground on which the United States Circuit Court in Arkansas refused a preliminary injunction against your company several years ago under the Bell patent, although the injunction was asked for after the United States Supreme Court has sustained that patent.

With reference to the Ford patent, dated August 26, 1890, No. 435,295, for an automatic telephone system, which we understand is owned by your company, we have examined the same and are of opinion that the patent is good and valid and in force for the subject-matter of its claims.

LITERARY.

"How to Become a Successful Electrician." By T. O'Conor Sloane, Ph. D.; 189 pp., illustrated; cloth, $1. Sent prepaid, on receipt of price, by Electrical Review Publishing Company, 13 Park Row, New York.

The author, besides giving excellent advice to one about to take up the study of electricity, lays down the studies to be followed, methods of work, fields of operation and ethics of the profession. There are 19 chapters, the first being introductory and the others covering mathematics, physics, chemistry, electricity at home, mechanical engineering, drawing, teachers, electrical factory work for students, college education, steam engineering, the manufacturing engineer, the constructing engineer, the station engineer, inventing, original investigation, success, reading and ethics.

A $22,500 Trolley Verdict.

Anna Tholen, six years old, had both her feet cut off by one of the Brooklyn, N. Y., City Railroad Company's trolley cars on February 8, 1893. Last Saturday, as a result of her suit against the company for $50,000, the jury, after a brief deliberation, gave her a verdict for $22,500. Judge Van Wyck, who presided at the trial, gave Thomas E. Pearsall, the lawyer for the plaintiff, an extra allowance of $1,000.

Wall Street and the Electrical Stock Market.

There were two features in the electrical financial world during the week. One was the excellent showing made by the Westinghouse annual report as compared with the General Electric report, and the weakness of General Electric in consequence. This report is published in full in another column. A comparison of Westinghouse with General Electric is pertinent. It is given following:

ASSETS.

	General Electric.	Westinghouse.
Patents and franchises	$8,159,264	$4,379,831
Mfg. plants, etc	3,941,128	886,452
Real estate, etc	323,685	464,403
Stocks and bonds	5,490,963	4,326,389
Cash	591,143	325,694
Notes and accounts receivable	8,934,159	2,718,606
Inventories and work in progress	6,033,136	1,545,472
Advances to leased companies	.....	109,124
Miscellaneous	.....	66,339
Profit and Loss	12,454,967	.....
Total	$45,928,449	$14,722,314

LIABILITIES.

Stock	$34,711,600	$9,016,596
Bonds	10,000,000	757,685
Accounts	323,084	311,749
Bills payable	744,341	804,233
Mortgages	26,200	.....
Accrued interest	83,333	.....
Sundry credits	39,889	.....
Surplus	.....	3,832,049
Total	$45,928,449	$14,722,314

The conclusions deduced from this comparison, taking Westinghouse figures as a standard and equal to 1, produce the following percentages:

	General Electric.	Westinghouse.
Patents and franchises	1.8	1
Plants, etc	4.4	1
Real estate	0.69	1
Stocks and bonds	1.2	1
Notes and accounts received	3.3	1
Inventories and work in progress	3.8	1
All assets	2.2	1
And the liabilities:		
Stock	3.8	1
Bonds	13.2	1
All liabilities	4.2	1

While the earnings show:
General Electric..... 2.20 Westinghouse..... 1
And the earned on capital:
General Electric.....0.52 Westinghouse..... 1

An analysis of these tables shows that in the items of "patents, franchises," etc., and "stocks and bonds," the difference between Westinghouse and General Electric is smaller than in other items. The difference in plant is the largest. The kernel of the comparison is the earnings. It is seen that Westinghouse earns $1 for every $2.20 earned by General Electric. That on the capital is equal to 1 per cent earned for dividends by Westinghouse for every .52 per cent earned by General Electric.

The report was very well received in Wall street and immediately caused a weakness in General Electric under bear onslaught. It was argued that Westinghouse stock was sufficiently high for these times. Such being the case that General Electric earning half as much must seek a lower level. General Electric opened the week at 38½, sold down to 35½ on Wednesday, between which figure and 36½ it ranged with considerable fluctuation up to the close. There were the usual rumors in circulation concerning the adverse condition of the property, a probable consolidation with Westinghouse, etc., all of which I do not credit. I am told that the General Electric has recently increased its force at Schenectady to 2,900 men. There was a story in the street, which received an unofficial denial, to the effect that the Ames estate had been liquidating considerable General Electric stock. It has been the belief in well-informed circles for some time that Mr. Ames, before his death, disposed of the greater portion of his General Electric at a great sacrifice, and that very little of it remains to the credit of his estate. The preferred stock dropped in sympathy with the common from 72 to 67. The debenture 5 per cent bonds were strong and quite active around 87.

North American sold between 4 and 4¼. This company will hold its annual meeting June 20. Books close May 21 and open June 21. Mr. H. O. Payne, president Milwaukee Street Railway Company, largely owned by North American, informs me that the street railway company's earnings at the present time show a loss of $500 per day as compared with the corresponding period in 1893.

American Telegraph and Cable showed considerable strength, advancing as high as 90 and closing at 89½.

Bell Telephone was without feature between 189 and 190. New England Telephone sold between 55 and 56¼. The company's report for the calendar year, 1893, shows a total revenue of $2,042,748; increase, $241,182; expenses, $1,560,080; increase, $194,958; net revenue, $482,668; increase, $46,215. The amount charged to new construction during the year was $357,087, of which $110,080 was expended for exchange aerial construction, $149,659 for underground work, $45,046 for equipment, and $62,301 for extension of toll lines. The company has in use upon its exchange and toll lines 1,060,090 feet of cable line carrying 16,301 miles of copper conductor. During the year 607 miles of copper and 420 miles of iron wire were strung for toll line use. The daily average of toll messages is 3,116 or at the rate of 1,000,000 per year. The bonded debt May 7, 1894, the date of the report, was $2,181,000.

The company elected its old board of directors on Monday.

Erie Telephone was strong between 45 and 46. The report for the quarter ending March 31 showed a surplus after dividends of $10,005, an increase of $925; fiscal year to March 31, $43,270; charges, $24.136; balance, $19,134. Total surplus, $56,156, a decrease of $13,845.

Westinghouse was quoted in Boston on Friday at 51½ bid and 51¾ asked for the preferred and 37 bid and 37½ asked for the assenting. Bain.

New York, May 12.

He Goes on Record.

To the Editor of Electrical Review:

Permit me to solicit the use of your columns to put myself on record as claiming to have discovered that a vacuum space from which all light rays are excluded is impervious to the passage of heat.

Very respectfully,
J. Ross Grove.

New York, May 13, 1894.

The City of Hawarden, Ia., is to put in a 1,000 light incandescent municipal plant, and has adopted plans and specifications prepared by Wm. H. Bryan, consulting engineer, St. Louis. The city is prepared to pay cash, and will receive bids up to May 25.

Westinghouse Electric and Manufacturing Company's Annual Report.

The annual report of the board of directors of the Westinghouse Electric and Manufacturing Company, of Pittsburgh, Pa., to the stockholders, under date of May 16, 1894, is published below in full.

The board of directors of the company is as follows: Charles Francis Adams, Lemuel Bannister, August Belmont, N. W. Bumstead, A. M. Byers, Marcellus Hartley, George W. Hebard, Henry B. Hyde, Brayton Ives and George Westinghouse, Jr.

The officers of the company are Brayton Ives, chairman; George Westinghouse, Jr., president; Lemuel Bannister, first vice-president and general manager; G. W. Hebard, second vice-president; W. F. Zimmermann, assistant general manager; Charles A. Terry, secretary and attorney; Ph. Ferd. Kobbé, treasurer; W. C. Clark, general agent and assistant treasurer; and F. H. Ketchum, auditor.

Pittsburgh, Pa., May 16, 1894.

To the Stockholders of the Westinghouse Electric and Manufacturing Company:

Notwithstanding the fact that there was a general paralysis in industrial affairs throughout the United States during the last nine months of the past fiscal year, your board is able to present herewith a financial statement for the year ending March 31, 1894, which it believes will prove satisfactory in every particular.

From the balance sheet it will be noted that the net profits from manufacturing and other sources amounted to $1,640,809.11 after charging to operating expenses, as heretofore, large sums for alterations and additions to buildings, for maintaining the machinery and tools in the highest order, and all sums paid for interest and discount, excepting interest on bonds and scrip, which has been charged off direct to surplus.

It will be seen that a large reduction in accounts payable, bills payable issued for merchandise, and those discounted with collateral has been made from the profits of the company, which further illustrates the careful manner in which the officers of your company have conducted its business. By the recent sale at par of the preferred stock which was in the treasury of the company, the bills payable have been further reduced since March 31, so that on May 9 there were outstanding only $569,982.64 of bills payable of all kinds, of which $37,869.04 were issued for merchandise.

WORLD'S FAIR LIGHTING CONTRACT AND EXHIBIT.

All of the apparatus used in connection with the World's Fair lighting contract and for exhibition purposes has now been returned to the warehouses of the company, and the final payments have been made by the World's Columbian Exposition Company.

The amount of the contract for lighting was $399,000, and for extras under the contract $88,704.47, making the total received by the company $487,704.47. All goods shipped to the Fair were charged at the cost of labor and material with 20 per cent added. After charging the account with all costs of every nature in connection with the running of the plant and of the exhibition, and crediting it upon the return of the material with the net cost of labor and material, it shows a net cost to the company of only $16,013.03 for a grand display of the company's apparatus, the advertising effect of which has been invaluable. The price at which the lighting apparatus used at the World's Fair, and the apparatus used for exhibit has been sold, will yield a handsome profit to the company.

It is gratifying to state in connection with this subject that the entire contract was carried out without friction of any character, and without a single deduction of any kind being made from the bills rendered by the company, and that the experience gained by the company in constructing such large apparatus was an important factor in the securing of the contract for the three 5,000 horsepower generators now being constructed for the transmission of power from Niagara Falls for the Cataract Construction Company.

NIAGARA FALLS POWER TRANSMISSION.

The awarding to your company by the Cataract Construction Company of the contract for three 5,000 horsepower generators for the transmission of the power of Niagara Falls to Buffalo and other points was an event of more than ordinary importance. The officials of the Cataract Construction Company had employed the most renowned electrical engineers of the world, and had spent some years in a full investigation of the subject, and finally contracted with your company because of a belief in its ability to successfully carry out such an important undertaking. The transmission of power by means of these generators involves the use of your company's Tesla patents covering the system of multiphase motors, and therefore the successful starting of this plant cannot fail to have a great influence in the development by your company of other plants for the transmission of power from waterfalls to remote points, by reason of the experience gained in this instance, and by reason of the ownership of the controlling patents. The three generators contracted for will soon be completed and put in operation.

INCANDESCENT STOPPER LAMPS.

The successful use at the World's Columbian Exposition of the stopper lamps manufactured by your company, and their large use in general lighting, have fortunately placed the company in a position to protect all of its customers from the aggressive action of the owners of the Edison patent covering the all-glass globe form of lamp. A steady advance has been made in the method of manufacture, so that your company is to-day producing a lamp which has no superior, and the use of which your officers expect to extend with great rapidity during the coming season on account of its quality and low cost of manufacture.

It may be fairly stated that the peculiar methods pursued by the owners of the Edison patent in their efforts to obtain a monopoly of the sale of incandescent lamps have resulted in a disastrous failure, for the price of incandescent lamps to the public at large has been greatly reduced in consequence of the success of your company in the production of non-infringing lamps. Your officers believe that they will be able to sell stopper lamps to the company's customers at a price not exceeding the manufacturing cost of the all-glass form, and thereby greatly promote the company's electric lighting business.

COMPETITION AND PATENTS.

Our competitors have continued to copy our plans and infringe many of our patents, and in one instance the company's officials were reluctantly compelled to have indicted and arrested the agents of a large corporation who had entered into a conspiracy and had thereby succeeded in robbing your company of valuable drawings and information. It is believed that the action of your officers in this matter will have the effect of preventing the unlawful appropriation of your drawings and other information in the future.

NEW WORKS.

In the last annual report your directors announced that they had accepted a proposition of the East Pittsburgh Improvement Company to erect, according to the plans of your company, a new manufactory upon a site of 23 acres. In consequence of the general depression in business, the letting of the work was deferred until January, when contracts were awarded at very low rates for the erection of a two-story machine shop 750 feet long and 230 feet wide, a two-story warehouse 750 feet long and 75 feet wide, and a boiler and power house, the whole having a floor space of over 10 acres. To these buildings there will be added in time a foundry, blacksmith shop and one or two other unimportant buildings, making the whole plant, when completed, a most comprehensive one in every respect. The above buildings will be of steel and brick, arranged with reference to the manufacture of modern electrical apparatus of the heaviest character, and will be so equipped with electric cranes, machinery and improved machine tools as to enable the company to manufacture its product so much below the cost in existing competing establishments that the company will, at the prevailing competitive prices, enjoy a very satisfactory margin of profit.

Pittsburgh is exceptionally well located with reference to the material required for the construction of electrical machinery, and has unrivaled facilities for the shipment of freight in all directions; and, being centrally located with reference to the consumption of electrical apparatus, your officers have full confidence in their ability to secure enough work at profitable rates to fully occupy the entire establishment.

In conclusion, we call especial attention to the exceptionally favorable position of your company with respect to the electrical trade. Its capital stock in proportion to its operations is small, and it has no contracts of any character with local lighting or other companies which can in any manner interfere with the sale of its apparatus. It has a harmonious management, and has an unequaled reputation with respect to the design and character of its apparatus; so much so that the company's standard apparatus is purchased and paid for without special guarantees of any kind.

The new works of the company will be completed and occupied during the present year, so that all of the manufacturing will be concentrated and large savings thereby effected. For the Board,

GEORGE WESTINGHOUSE, JR.,
President.

BALANCE SHEET MARCH 31, 1894.

ASSETS.

Cash in banks		$325,694 55
Bills receivable		373,445 51
Accounts receivable		2,345,161 20
Material in stock and in process of manufacture (at cost of labor and material)		1,545,472 22
Advances to leased companies		109,124 68
Bonds (par value, $249,800)		237,397 15
Stocks (par value, $6,489,490.16)		3,988,992 26
Real estate and buildings		464,403 48
Machinery and tools		886,452 67
Miscellaneous		66,339 07
Charters, franchises, patents, etc.		4,379,831 69
Total assets		$14,722,314 48

LIABILITIES.

Accounts payable		$311,749 75
Bills payable, issued for merchandise		116,933 85
Discounted with collateral		697,300 00

CONTRACT AND CONTINGENT LIABILITIES.

Scrip dividend		194,560 00
Stock subscriptions		13,125 00
United States Electric Lighting Company's six per cent 15 year bonds, $50,000 payable annually		550,000 00
(Bills receivable under discount, $528,550.65.)		

CAPITAL STOCK.

Preferred,	73,439.31 shares	$3,671,965 50	
Assenting,	103,309.62 shares	5,165,481 00	
Common,	3,583 shares	179,150 00	
			9,016,596 50
(In treasury 6,560.69 shares preferred; and 13,107.38 shares assenting.)			

SURPLUS.

Balance, March 31, 1893		$2,757,649 19	
Twelve months net earnings from business	$1,610,501 66		
From other sources	30,304 45		
		1,640,809 11	
		$4,398,458 30	
Less amount written off in adjustment of matters pending in 1890 and 1891	$19,198 78		
Ditto in current year	252,323 20		
		271,521 98	
		$4,126,936 32	
Interest on bonds	$36,000 00		
Interest on scrip	11,673 72		
Dividends	257,213 22		
		304,886 94	
			3,822,049 38
			$14,722,314 48

Dr. Holmes and His Sign.

Dr. Bayard Holmes, who has a handsome place on Fortieth street and Drexel Boulevard, Chicago, has attached a placard reading as follows to an electric light pole erected in front of his residence: "This pole is doubtless placed in my front yard according to law. Our $3 a week aldermen have, in so far, confiscated my property. We should bear with humility such thefts, looking to mansions in the skies, where, so far as we know, no franchises have yet been given away. This is posted for the information of the curious passersby. — Bayard Holmes."

Commenting on the above, the Chicago *Record* does not display its usual good judgment when it states that: "Dr. Holmes and very many other good citizens are approaching that degree of knowledge of the absurdity as well as infamy of the existing system of franchise-giving which will cause the speedy abolishment of that system."

The Citizens' Telephone Company, at St. Joseph, Mo., is installed in its new quarters at Felix street and Frederick avenue.

The Gaines Underground Trolley System.

The system of underground trolley railway illustrated herewith is the invention of Charles A. Gaines. A model showing its operation is on exhibition at the office of the Gillette Clipping Machine Company, 201 East Twenty-third street, New York. Mr. Geo. H. Gillette, secretary of this company, is a part owner of Mr. Gaines' invention. The system may also be applied to elevated railroads.

Referring to the illustrations, A designates the conduit, *a* the slot, B B the transverse frames at intervals for supporting the track rails and slot plates, and C the conducting main. The conducting rails D D are supported at suitable intervals by insulating brackets *b b* connecting to the frames B B. The sections of conducting rails D D may be made of any suitable or convenient length, say for example 50 feet, and the successive sections are insulated from one another at their ends either by a sufficient air space or by the insertion of an insulating block between them. Each section is connected with the conducting main C through branch conductors *c d* and a switch E.

Each motor car carries one, or, preferably, two, trolley wheels F F. The trolley wheels are carried by levers G G, which are pivoted to the running plate H, which is suspended from the car and travels in the slot. The levers G G are arranged wholly beneath the slot in the conduit, and to impart the requisite pressure to the trolley wheels a spring I is provided, connected between the levers in the manner shown, so as to tend to draw them both downward. Suitable electrical connection is made between the trolley wheels F F and the motors M carried by the car, and this connection may be made in the manner shown in Fig. 2, by the trolley wheels being metallically connected to the levers G G, and the pivots of these in turn connected to conductors *e e* extending up through the plate H and connecting with a conducting wire *f* leading to the respective motors, the opposite terminals of the motors being connected as usual to the frame and axles, so that the return current passes by the wheels to the rails and track structure.

The operation may be traced, the car being assumed to move from right to left in Fig. 2, as indicated by the arrow. As the car reaches the junction or insulation between the rail sections D D, and after its advancing trolley wheel F passes over this junction onto the new section, the shoe J encounters the first roller *n* on the first plunger m^1 and depresses it, thereby rocking the elbow lever l^1 and pulling on the rod *k* so as to slide or move it toward the right. This movement closes the switch E and turns the current into the new rail section D, which up to this instant has been dead. The parts are shown at this instant in Fig. 2, the motors on the car being fed through both rail sections and both trolley wheels for a moment. Immediately thereafter the shoe encounters the roller *n* on the second plunger *m*, and thereby locks the lever *l* and moves the rod *k*, extending thence rearwardly by pulling or sliding it forward sufficiently to operate the switch E to open circuit the conducting rail section D to the rear, so that from this instant the motors on the car are fed with current solely from the conducting rail section D upon which the advancing trolley wheels has entered. When the car has advanced to the end of this section D, the same operation will be repeated, that is, the section in advance of it will first have its switch operated to turn the current into it, and instantly thereafter the section over which the car has been running will be open-circuited and rendered dead. The car in its advance thus causes the current to be turned into each conducting rail section in advance of it, and to be turned off from each section in the rear, so that all the sections behind each car are open-circuited until they are reached by the next following car. Consequently, the leakage from the bare conductor (replacing the usual overhead trolley wire) which is traversed by the trolley wheels, is reduced to a minimum.

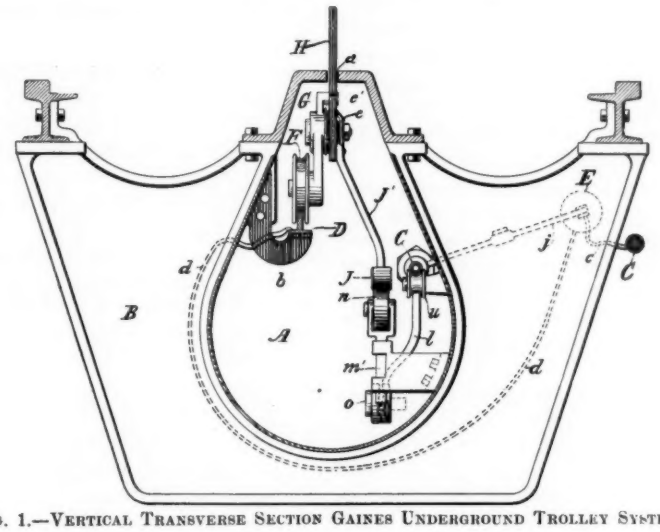


FIG. 1.—VERTICAL TRANSVERSE SECTION GAINES UNDERGROUND TROLLEY SYSTEM.

A new "safety compensating trolley," the invention of G. W. C. Lomb, a mechanical engineer of Birmingham, Ala., was tested recently by the Birmingham Railway and Electric Company. The chief advantage claimed for the device is that it never leaves the wire except at the will of the operator.

Electric Light and Power Controller.

The Electric Selector and Signal Company, 45 Broadway, New York, is making great progress in the introduction of its electric light and power controller. Mr. P. H. Alexander, who has an unusually wide acquaintance in the electrical field, has been appointed manager of the company's electric light and power department, and will devote his energies to exploiting the merits of the controller. This is a device to control absolutely the output of current to any individual lamp or motor or any group of lamps or motors, starting lamps and extinguishing them from the central light and power station, and from the same station regulating the hours the motors are to be operated. The apparatus consists of three distinct parts, the transmitter, the selector and the switch.

The transmitter is the only central station instrument. It consists principally of a disk or a number of disks arranged on an axis, each disk having on its periphery certain elevations or contact points, which, while rotating, make contact with a metallic brush and through it send out current in impulses, which impulses in turn actuate the other devices. The instrument is small, and when designed for 10 circuits takes up but 8x8 inches table-space, and is about six inches high.

The selector is the instrument on the line which receives the electrical impulses from the transmitter. It consists of a magnet and one disk, the notches in the latter corresponding with the elevations on the periphery of the transmitter disk, which is to actuate it. If the right number of impulses are received from the transmitter, two contact points are closed, and the current flowing through them operates the switch or switches to be thrown by it.

The switch can be made of any pattern or any size and is a simple magnet-switch operated by the armature of the magnet, which receives its current from the transmitter through the contact points of the selector. More than one switch may be operated by each selector. The selector and switch are each securely encased in an iron box 8x6x4 inches in size.

The amount of current to operate this controlling device is but nominal, and can be taken from any dynamo at the station. About one-half of an ampere for but seven seconds is sufficient to turn on or off any subcircuit. The instruments themselves are arranged in series, and a single iron wire of small size—No. 14—is sufficient to carry the current.

The whole output on any machine can be sent over one circuit, and yet each lamp or group of lamps, or each motor or group of motors, be absolutely under the control of the man in charge of the central station, saving many, many times the cost of this apparatus in switchboard devices, wires, poles, etc.

But the economy is not only in the saving of material, but also in the consumption of coal. This is especially true of the motor service. It is a well-known fact that motors are often run more than the number of hours agreed upon with the customer, thus working to the disadvantage of the current-supplier. By the above device, the hours of service having been agreed upon, the motor is started and stopped by the man in charge of the central station, and, if it is desired to run in extra hours, it can only be done on application and by paying for such extra service.

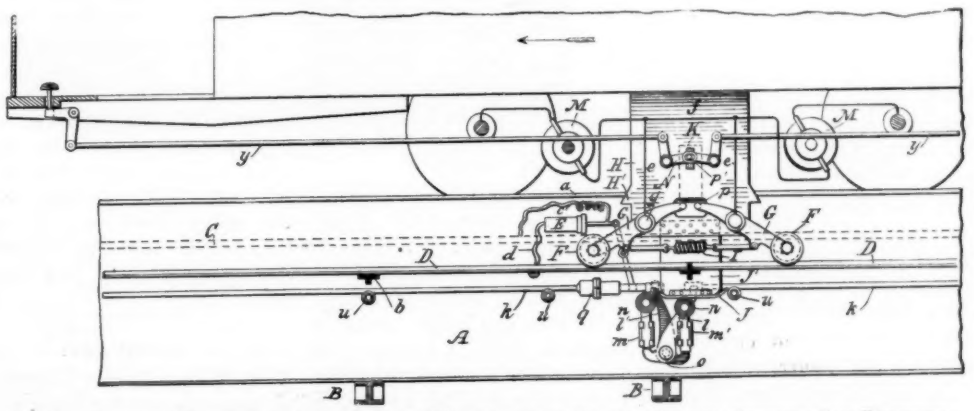


FIG. 2.—VERTICAL TRANSVERSE SECTION GAINES UNDERGROUND TROLLEY SYSTEM, SHOWING CAR EQUIPMENT.

Two employés of the Brooklyn Heights Railroad Company, while engaged in erecting trolley poles near the entrance to Prospect Park, Brooklyn, N. Y., were ordered to stop work by a park policeman. They stopped long enough to assault the policeman and will now have to answer in the police court.

ELECTRIC RAILWAY NOTES.

Lock Haven, Pa., is to have an electric street railway.

The Supreme Court has forbidden the use of elevated railroads in Philadelphia.

Nathaniel Baxter, Jr., has purchased the United Electric Railway, of Nashville, Tenn., for $138,500.

The electric street railway at Athens, Ga., six miles in length, is to be offered at receiver's sale June 5.

The Green Bay, Wis., Railway Company thinks of building a spur to Waupaca from Ogdensburg or Scandinavia.

The electric railway at Peru, Ind., was compelled to shut down on May 4, as owing to the miners' strike there is no coal.

The Morris Cove and the West Haven, Conn., electric roads are considering the advisability of securing a trolley sprinkler.

The Consolidated Street Railway Company at Cincinnati will run funeral cars if permission from the city authorities is granted.

The Sioux City, Ia., Cable Railway Company is making preparations to equip the Winter cars for service under the electric system.

The Marlboro, Mass., Electric Street Railway Company has voted to increase its capital stock sufficient to pay for extending the line to Hudson.

The Johnstown and Gloversville Railroad has leased the Cayadutta, N. Y., electric railroad for 999 years, and the Railroad Commission approved the lease.

The electric railway at Belleville, Ill., was put in operation on May 1. The citizens were highly pleased with the road and appropriately celebrated the opening.

Lansing, Mich., real estate men are contemplating the organization of a company for the purpose of constructing an electric railway to Englewood Park addition.

The amalgamation of the electric and horse car street railways at Winnipeg, Man., is now complete and there will be but one street railway company in Winnipeg.

It is expected that an electric line will be built this Summer from the Westerly depot to Watch Hill, R. I., by capitalists interested in the Norwich, Conn., street railway.

It is reported that an electric railway 300 miles long, to cost $2,000,000, and connecting Boise City and Lewiston, Idaho, via White Bird, Little Salmon and the Weiser Valley, is in contemplation.

Work is being pushed by the construction gang on the eastern end of the Shamokin-Mt. Carmel, Pa., electric railway, and the officials in charge predict that they will have cars running by July 1.

The Sioux City, Ia., Street Railway property has been sold to the bondholders under foreclosure to satisfy a judgment of $578,000. The purchasers are nearly all Philadelphians and will organize a company to operate the line at once.

The building of the electric railroad in Peekskill, N. Y., has been abandoned for the present owing to the inability of the company, which had been given a franchise, to obtain the necessary capital.

Civil Engineer W. L. Dougan, of Troy, has been awarded the contract for surveying the route for an electric railroad between Gloversville, N. Y., and Mountain Lake, nearly five miles north from Gloversville.

At the special election held in Sheboygan Falls, Wis., for the purpose of voting $5,000 to the Sheboygan and Sheboygan Falls Transit Company, the proposition was voted down after a hot contest, the vote standing 132 for and 138 against it.

The Raleigh, N. C., Electric Street Railway has been sold for $4,000 and purchased by a syndicate of which the General Electric Company is a member, and, if the sale is confirmed, it will be re-equipped and operated in connection with the electric lighting plant.

Mr. C. F. Carter, a special commissioner of the Dallas and Fort Worth, Tex., Rapid Transit Terminal Railway Company, has sold the road, together with its franchises, etc., to Henry C. Scott, trustee, of St. Louis, for $90,000, also the West Dallas Railway for $19,000.

The Gate City Street Railway, at Keokuk, Ia., was sold to satisfy a mortgage of $85,000 by the American Trust Company, of Boston. The property was sold to J. C. Hubinger. The purchase price was $500 less than the amount of the preferred claims against the company. One of the creditors has petitioned the Superior Court not to confirm the sale.

It is reported from Redlands, Cal., that papers have been signed granting to a prominent sewing machine company extensive water-power rights in the canyon of the Santa Ana River. It is said that a large electric plant will be put in to furnish light and power for cities within a radius of 50 miles. Also that part of the plan is to operate an electric road from Redlands to Los Angeles.

The county commissioners somewhat disarranged the plans of the Akron and Cuyahoga Falls, O., Electric Railway Company in refusing to allow them a franchise for the building of their line over the bridge spanning the Cuyahoga River, at Akron. The company will not, however, abandon the road, but will build, at once, a bridge east of the present one and, by diverting from the main road a short distance beyond the new road, reach Cuyahoga Falls by as short a route.

City Electrician Gilbert has reported in favor of No. 00 tinned copper wire to carry the return current of the trolley system of the Hartford, Conn., Street Railway Company. The wire is to be laid on the top of the ties and bonded to the end of each rail with No. 0 tinned copper wire at intervals of 500 feet to be connected by similar wire to a square, flat iron plate, two by two feet, sunk six feet in the ground. The Hartford street board has approved the recommendations.

Judge David A. Depue has informed the Essex County, N. J., Grand Jury, which has almost completed its work, that he will shortly give its members instructions as to whether the use of Newark's streets by the street railway companies, particularly those operating trolley lines, would not render them indictable for negligence and maintaining a nuisance of much danger. He will do this in open court after the jury has gone further in its investigation of the several recent fatal accidents caused by trolley cars.

The Louisiana Electric Light Company, of New Orleans, of which Mr. Brainard Rorison, of Fort Wayne, Ind., is the active head, has closed a long-time contract with the New Orleans Traction Company to furnish the latter company with power for its entire system of electric railways. About 600 cars are required for the service. This is a very important deal, and makes use of the machinery in the daytime that would otherwise be idle the greater portion of the time. All the railways of New Orleans, with one exception, are included.

The contract for building the Walbrook, Gwynn Oak and Powhatan Electric Railway, of Baltimore, Md., has been awarded to the White-Crosby Company. The work is to be finished by June 20. The road will extend from Walbrook to Gwynn Oak, ending near the Powhatan Cotton Mills. The length will be about four miles. The road will connect with the Lake Roland Elevated at Walbrook, and arrangements have been made for the transfer of passengers. The current will be supplied by the Lake Roland Elevated Railway Company.

The stockholders of the Electric Traction Company, of Philadelphia, have voted to increase the capital stock of the company from $2,500,000 to $8,750,000. There are at present 50,000 shares, and the increase will be 125,000 shares. The new stock is to be issued from time to time at the option of the Board of Directors, and it is understood that they have decided to issue 50,000 shares at once. It is stated that the entire subscription will be called in at once. Present stockholders have the privilege of subscribing to the new stock at par.

OBITUARY.

Dr. William Theodore Barnard died of hemorrhage of the lungs at Washington, D. C., on May 9. In 1890 he became president of the United States Aluminum Company, of New York, which operated a plant at Boonton, N. J., for the production of aluminum by electricity. Dr. Barnard built the first elevated railroad in Chicago, the "Alley L" of the Chicago and South Side Rapid Transit Company, and became its president. During the past Winter he had been engaged in expert electrical and railroad work in New York.

The electric light plant at Nanaimo, B. C., was burned on May 6. Loss, $50,000; insurance, $12,000.

WESTERN NOTES.

The Northwestern Elevated Railroad Company's chief engineer, Mr. Weston, is preparing plans and specifications for the steel superstructure, and Dunlap Smith and staff are securing the right of way. Mr. D. H. Louderback expects to secure an easement through some of the down-town buildings in consideration of establishing a station in such buildings. Electricity will be the motive power, a two-track structure will be built south of the river and a four-track structure north of the river the two inside tracks to be used for fast through business.

An Important Decision.—In a petition for a writ of mandamus, asking that the city of Chicago be compelled to pay a judgment of $200 recovered by the relator for the death of a horse, it was held that a justice of the peace cannot go outside of the statute referring to justices of the peace for the purpose of acquiring jurisdiction of the person of a defendant, and there being no statute providing upon whom a summons issued by a justice of the peace against a municipal corporation shall be served, the justice was without jurisdiction, and the judgment against the city of Chicago is void. The opinion in full may be found in the Chicago *Legal News* of April 21.

The North and West Side street railway companies have just secured additional franchises for electric roads. In return for the valuable privileges granted, the companies agree to pay certain judgments amounting to $30,000, recovered against the city, and to pay toward the extension of the city lighting plant the sum of $10,000 the first year, $20,000 the second and $25,000 for each succeeding year. These amounts in no wise represent the value of the concessions, but in view of the determination of the council to give the franchises away free of charge, they do stand as an indication that Chicago has a mayor who is determined that while he holds office the city shall be compensated for privileges granted, as far as it lies in his power to compel compensation.

The Antwerp Exposition.—The ELECTRICAL REVIEW is in receipt of a letter from Mr. Alexander Campbell, who having spent six months in a practical study of the World's Fair, at Chicago, is now studying the electrical features of the Antwerp Exposition. Perfect weather for several weeks has enabled much to be accomplished, but the work of installation is not advanced to that degree that will insure a fair number of complete exhibits on the opening day. One cause of delay is the absence of facilities for handling heavy machinery. While the main building does not compare with the best buildings at Jackson Park, from an architectural standpoint, it is well adapted for exhibition purposes. It is understood that only 300 arc lamps will be in service. Some Gould pumps belted to gas engines are in place. The wiring of the Exposition is in the hands of the Hydro Electric Company, who operate many small stations in the city by water-power. F. DE L.

Chicago, May 10.

ELECTRIC LIGHT FLASHES.

Littlestown, Pa., wants an electric lighting system.

It is said that a new electric light company will soon be organized at New Britain, Conn.

The power house of the Royal Electric Light Company, at Montreal, Que., was burned on May 1. Loss, $100,000; covered by insurance.

The citizens of the village of Cuba, N. Y., are agitating the question of lighting their village with electric lights. A municipal plant is favored.

Mechanic Falls, Me., has practically decided to buy the Page's mills water privilege for furnishing the business section of the town with water and electric lights.

The plant of the Westinghouse Electric Light, Heat and Power Company, of York, Pa., was seized by the sheriff, on May 2. The seizure was made to satisfy foreign creditors. Liabilities, $25,000; assets, $50,000.

A movement is on foot to light the village of Fonda, N. Y., by electricity. The proprietors of the Johnstown plant are negotiating to secure the contract. The taxpayers are to decide whether or not the light will be used.

In the Brockton, Mass., Board of Aldermen, on May 7, an order was passed directing the committee on lights not to renew the contract for the 16 candle-power incandescent lights now used in the streets which expires June 1.

The argument on the motion for injunction made by the Consolidated Electric Storage Company against the Electric Storage Battery Company came on for hearing before Judge Green, at Trenton, on May 8. It will be resumed on May 29.

The April statement of the Edison Electric Illuminating Company, of New York, shows a net increase of $20,309. The Brooklyn Edison Company for the same month shows a net increase of $4,231. This company has issued $500,000 additional of stock.

Pierce, Wright & Company, the owners of the Bloomfield mill, at Bloomfield, Neb., are making arrangements to put in an electric light plant, providing the citizens will take 200 lights at $1 per month. The scheme is meeting the approval of business men.

The Helena, Mont., Electric Light Company has passed into the hands of a receiver on a petition of its creditors. It is understood that the plant will be purchased by the Helena Gas Company, which will operate the electric light plant in connection with its gas works.

President Rauschenberger of the Milwaukee, Wis., Common Council has introduced a resolution authorizing the appointment of a special committee to act with the board of public works and the city attorney in the formulation of a plan by which the city shall own its own electric lighting apparatus and furnish its own light.

The Edison Electric Light Company and the Edison Electric Illuminating Company, of Brooklyn, N. Y., began suit on May 5, by filing complaints against the firms of Frederick Loeser & Company, Wechsler Brothers & Company, Abraham & Strauss, and Smith, Gray & Company, for infringing the Edison patents under which the complaining companies manufacture and sell electric light apparatus and its appurtenances.

General Electric Company's New Switchboard.

Such ingenuity has been expended in the improvement of the switchboard to bring it down to convenient proportions and yet to have upon it all the necessary instruments within easy reach of eye and hand. We show one lately designed by the General Electric Company for isolated plants, in which convenience seems to have reached a high expression. The complete board comprises a panel for each generator and one for each set of five feeders. The generator

GENERAL ELECTRIC COMPANY'S NEW SWITCHBOARD.

panel is equipped with newly designed switches of high conductivity and durability, each of which has its own fuse holder. The rheostat and ampere meter are of the latest and most compact type. Each feeder panel carries an improved voltmeter and two-lamp ground detector, the push button being shown in the lower part of the panel.

The advantage of this arrangement of switchboard lies in the possibility of uniformly enlarging the board by adding panels. They can be set side by side and be connected with tie bars, and are furnished ready for installation and receipt of the generator and feeder connections.

A French electrician, M. Trouve, catches fish by sinking in the water a net with incandescent lamp attached. The curious fish collect around the light, when a pneumatic tire around the edge of the net is silently inflated and rises to the surface, entrapping them without frightening them, and, hence, without destroying the spawn—a great drawback to ordinary net fishing.

QUESTIONS AND ANSWERS.

BY OUR "QUESTION EDITOR."

To the Editor of Electrical Review:

Will you please inform me through the Electrical Review which New York company offered a prize of $50 for the best underground trolley system and to whom I may apply for particulars.

Respectfully yours,

J. T. P.

Jersey City, N. J., May 4.

The Metropolitan Traction Company, whose offices are in the Cable building, New York city, last March offered a prize of $50,000 (not $50) for the best underground electric railway system suitable for use in New York city. They expected that the State Board of Railroad Commissioners would act as judges in the competition, but the board either had not or could not get the authority to act in such a capacity and the matter has been dropped. I believe about 400 schemes were submitted to the Metropolitan Traction Company. You might write to them, if you desire further information.

Metropolitan Electric Company's Catalogue.

The first annual catalogue of the Metropolitan Electric Company, Chicago, has been issued. It is flexibly covered in red with gold stamping. The illustrations are so numerous that descriptions are almost unnecessary. There are 452 clearly printed pages on which everything electrical, from ammeters to zinc plates, is enumerated, illustrated, described, priced and furnished with a trade number for convenience in ordering. There are numerous valuable tables and a cipher telegraphic code included in the book. President William H. McKinlock should be proud of his company's first effort in catalogue making, and every user of electrical supplies should be prompt to possess a copy.

At The 'Phone.

[*From the Cincinnati Tribune.*]

There are sounds that seem to soothe us,
There are sounds that seem to move us—
As the cradle song in opera, or the rooster's early crow;
There are times when nothing pleases
And tormenting thoughts will tease us—
Then it does me good to listen to her musical "Hello."

'Tis so nicely regulated
And so sweetly modulated
That I oft would linger longer, if I did not jealous grow;
For some fellow's sure to break in
With a sound that I must take in
While I'm patiently awaiting to hear one more "Hello."

"Wait a moment," says she sweetly,
And she switches him off neatly;
Then, uninterrupted, tells me what she knows I want to know.
Yet there are no honeyed phrases,
For "the chief" is "keeping cases;"
But she manages to call me something more than mere "Hello."

Although I've never seen her,
Curiosity's no keener
Than when first I heard her voice repeat a call, distinct and slow;
For in my mind I've photo-ed her,
And in my heart I've voted her
The loveliest and the brightest girl that ever said "Hello."

J. C. HILDEBRAND.

The Canuck and the Telegraph.

Mr. J. N. Taylor has an article on "The Romance of the Telegraph" in *Donahue's Magazine* in the course of which he relates an anecdote of an old French Canadian woman who spent half a day gazing at the telegraph wires that stretched along in front of the little old house in which she lived. She was watching for a message, and a passer-by who was attracted by the old lady's attitude asked her what she was looking at, and if she expected to see something pass on the wires, to which she replied:

"Dere's long taime ah'll look does ting, me sometaime morneen', sometaime heev'nin', but ah'll nevair see someting go pass on 'eem. How ees dat? W'en ah look long taime, by'm bye he's mek sometaime curieuse noise lak sing, den ah spose he's hurry fas' as caint see someting any more? Ah don honderstan' me."

A Compliment From a Printer.

To the Editor of Electrical Review:

If you care to know what a printer of 36 years' standing (part "setting") thinks of the typographical appearance of the Electrical Review, hark ye! *It is simply immense!* Compared with its predecessors and some of its competitors, it is like a modern parlor car in comparison with the "arks" we once rode in; like the American liners "New York" and "Paris" compared with a canal boat; and like Delmonico's as an offset for a "country hash house."

Yours, J. C.

New York, May 9.

Indian Students Appreciate The "Electrical Review."

To the Editor of Electrical Review:

We, the Indian students of the Carlisle Indian Industrial School, appreciate very much the Electrical Review. It is a very interesting paper and much read and appreciated.

Very respectfully,

WILLIAM CANEFELL,
Tribe Chippewa.

In charge of the large boys' reading-room.

Carlisle, Pa., April 30.

THE ELECTRIC RAILWAY.

A LECTURE IN THE COOPER UNION ELECTRICAL COURSE DELIVERED BY T. COMMERFORD MARTIN.

(*Concluded from page 239.*)

Now, it was obvious to Mr. Vance and his city associates that they could greatly increase the rapid transit facilities of Yorkton, on either the elevated or the underground plan, but it involved enormous expenditures, and, meanwhile, they had a problem nearer at hand. What they wanted to do was to give the people rapid "rapid transit," but as a preliminary stage they resolved to electrify the surface roads in their control. That is the problem with which they are dealing at this minute, with all the resources of the electric art at their disposal and all the experience of many years to guide them, and yet they are curiously uncertain as to what they shall do, and have actually offered a prize of $5,000,000 for the system that will answer their purpose.

Storage battery traction, if the truth must be told, they are a little bit afraid of. Just at the moment when a road in the city with one form of battery and motor shows excellent results, the news reaches them from the national capital that somewhat analogous methods there have been found too costly, too troublesome and too sloppy. They believe in a self-contained, self-propelling car or locomotive, but they think there must be something wrong with a method which would require the locomotive not only to run into the round house every few hours, but to have its boiler and fire box removed and put back again every trip.

Much perplexed as to storage batteries, these worthy street railway people of Yorkton, with enthusiastic Mr. Vance at their head, encouraged by reports of what is being done at Buda-Pesth in Hungary, are now looking deep into conduit systems, all of which want that $5,000,000 prize. Their name a few months ago was "legion," and it is now "sands of the sea;" but in reality there are very few worthy of consideration. I show a few here, very rapidly, and simply to give an idea of the main features and to illustrate the range of choice. As a matter of fact they group broadly under four heads or classes, namely, open conduits and closed conduits, also conduits in which the circuit is alive all the time and conduits in which sections are rendered alive by the passage of the car which engages some mechanical or electro-magnetic circuit opening or closing device. The student is impressed with the fact that one of the main points in conduit operation is to keep the two sides of the circuit free and independent. Both sides being so near the ground, and one being part of it if the rails are used as return, there is necessity of extra precautions against short circuit.

After all, it is possible that we may see, and that Mr. Vance and his friends may determine on some ingenious combination that I have not yet mentioned, namely, one in which the car uses a conduit, but has a fair equipment of batteries which are always on the car, and get their charge from the conduit system. Just what may be done in this direction, I do not know, nor do I know just how soon the great city of Yorkton will be enabled to catch up in the march of progress in electric traction, but I do hope it will do so soon, with the help of one or other of the plans I have tried to explain to you to-night.

At the close of the lecture, Dr. G. Q. Colton came forward by invitation of Mr. Martin, and, by way of contrast between past ideas and modern results, exhibited and described the very same "electro-magnetic" engine or motor that he had used 47 years before in lecturing on the electric railway. This motor exemplified on a circular track about six feet in diameter propulsion by electricity, the supply of current from a remote source, direct to the motor; the use of the track as part of the circuit, and the operation of a tow car motor and trailers. Dr. Colton explained to his audiences 47 years ago that had he power enough he could run such a train from Pittsburgh to New Orleans.

The Terre Haute Street Railway Company.

The above enterprising street railway company, of which Mr. Russell B. Harrison, son of ex-President Harrison, is president, was the first road to introduce the new No. 12 electric motor and No. 14 controller manufactured by the Westinghouse Electric and Manufacturing Company, and illustrated in detail in the ELECTRICAL REVIEW of May 2. President Harrison has kept his road abreast of every improvement, and in a recent letter to this office states that he has no hesitancy in saying that the new No. 12 motor is the best he has ever seen and is giving the very best results for efficiency, etc.

In these days of progress there is no excuse for poorly equipped electric railways, and the example set by the progressive president of the Terre Haute company is a highly commendable one.

The Carpenter Electric Company Wins a Suit.

Judge Nelson has filed his decision at St. Paul, Minn., in the case of the Enamel Insulator Company *vs.* Carpenter-Nevens Electro-Heating Company *et al.* This suit was brought to set aside and declare void letters patent owned by one of the defendants, as well as the right in and to an electro-heating machine. The complainant is also the owner of a patent in an electro-heating machine which is substantially identical, known as the Morford patent. The decision follows a previous decision of the Patent Office tribunal, before which the case came up on an interference declared by the Patent Commissioner between Morford's application and the Carpenter patent, and delares the Carpenter patent void, as Morford was the prior inventor.

The Schuyler Electric Company.

The works of the Schuyler Electric Company, at Middletown, Conn., of which Mr. Charles E. Dustin, is president, shut down on May 1, awaiting the result of a reorganization of the company. The company has heretofore been closely associated with the General Electric Company and has done considerable work for it. This business has now been withdrawn. The plan is to reorganize the company independent of the General Electric Company, and until the reorganization is brought about the plant at Middletown will remain idle. The company is in good financial condition and will resume business when the reorganization is completed.

Clinton E. Woods.

Clinton E. Woods, whose portrait is presented on this page, was born in Massachusetts in 1863. Being left an orphan at 10 years of age, he was obliged to obtain his livelihood and education as best he might. Serving in miscellaneous employments until 1886 he drifted into steam and electrical work, being first identified with the local central station at Pittsfield, Mass., afterwards at Peekskill and Newburgh, N. Y. From this he worked at general construction and engineering until 1889 when he entered the employment of the National Electric Manufacturing Company, Eau Claire, Wis., as its inspecting engineer, serving in this capacity until 1892, when he was made its electrician-in-chief, which position he held until the Spring of 1893, when he pooled issues with the Standard Electric Company, of Chicago, Illinois, and it is here that his work has won for him reputation and prominence in the electrical field, as he has shown that it is possible for one man to master a thorough

CLINTON E. WOODS.

knowledge and practical application of all classes of dynamo electric machinery and accessories, having designed for this company a complete line of arc, alternating and constant potential dynamos, motors, etc., including such accessories as transformers and instruments, in the short space of 12 months. By this he has demonstrated the possibility of producing a commercial product in its entirety without going through any experimental stage.

Mr. Woods is not only an electrician, but a manufacturer, having advanced many improved methods of manufacturing dynamo electric machinery which have greatly enhanced the value of his work from an artistic and mechanical standpoint.

From the knowledge and ability Mr. Woods has displayed and opportunity for results which are in his possession much is looked for from his future work.

The Board of Police Commissioners of New York city have received a communication asking that policemen be stationed in 135th street at Lenox, Seventh, Eighth and Fifth avenues to protect school children from the trolley cars. The board directed Superintendent Byrnes to detail officers at the crossings during school hours.

Bargains at Queen & Company.

With a firm doing as extensive a business as Queen & Company, Philadelphia, a large number of instruments excellent in design and construction, but not conforming to their regular stock, are bound to collect.

Some of these are imported for exhibition purposes or for experiment, others are instruments whose place in the catalogues have been taken by later designed instruments, while others have become much shop worn by remaining on their shelves.

Among the pieces which they now have on hand is a standard ohm described in the London *Electrician*, April, 1892; ammeters and voltmeters of the magnetic vane and Desprez-Carpentier and some manufactured by Hartmann and Braun and Schukert; Kohlrausch spring ammeters; Siemens dynamometers and wattmeter; Swinburne static voltmeter and non-inductive wattmeter. This last instrument consists of a small movable fine wire coil in series with a high non-inductive resistance and a coarse wire stationary coil. The fine wire is placed as a shunt across the circuit whose power is to be measured, while the coarse coil is placed in series with it. A torsion screw and spring attached to the fine coil allows the needle to be fastened to it to be brought back to zero. The watts are proportionable to the torsion of the spring necessary to accomplish this. Another instrument is a balance galvanometer devised by the General Electric Company to show when the voltage of a dynamo is equal to the voltage of the bus bars, so that when it is thrown in circuit it may take a proper part of the load. There are also several types of galvanometers with shunt boxes, lamp stands and scales.

Space in their show rooms being imperatively necessary, Queen & Company have decided to offer these instruments without regard to their original cost. Many electricians will be delighted to have the opportunity to purchase instruments like these at a fraction of their real value. They should write promptly to Queen & Company asking for a circular in order that they may secure first choice.

New York Electrical Society.

Mr. W. S. Hadaway, Jr., delivered a lecture on "Electrical Heating From the Engineering Point of View" before the New York Electrical Society, at Columbia College, last Thursday evening. The lecturer took up the theories underlying the generation of heat by electricity, and showed by practical examples the most economical way of applying these principles in daily life. The lecture was illustrated by a variety of the most recent electric heating appliances intended for domestic use and general application, and this apparatus was shown in actual service.

Ground was broken last week by the Suburban Traction Company for the proposed extension from the Washington street line to Eagle Rock, West Orange, N. J.

Automatic Muck Bar Shear.

In the process of rolling steel into thin sheets, it would be impracticable to roll each sheet separately, as it would not retain its heat, and the following method is adopted:

A billet of steel of sufficient size to make a large number of sheets is heated and passed a number of times through a train of rolls, each pass lengthening the bar and reducing its size. It leaves these rolls in the form of a bar 20 or 30 feet long and something like an inch thick by eight inches wide, these dimensions depending upon the size and gauge of the sheets to be made.

These bars, technically known as the muck bars, are cut up into uniform lengths and each piece is then repeatedly re-rolled and folded over, each rolling operation reducing the thickness and increasing the linear dimensions and each folding doubling the number of sheets in the final pack. After the last rolling the ends of the pack are sheared, leaving each sheet free to be separated.

It is very important that the pieces into which the muck bar is cut should be of uniform size and squarely cut, as upon this depends the size and form of the subsequent pack, and it will easily be seen that any error will be largely exaggerated with the successive passes through the rolls.

The method heretofore employed for shearing the muck bar has been to carry the bar to the old-fashioned alligator shear, place the end against a fixed gauge, which determined the length of the pieces and pass the bar along by hand for the successive cuts.

This method not only requires the labor of several men to handle the bar, but calls for considerable skill on the part of the shear man, and unless great care is used, the results are liable to be unsatisfactory.

The illustration represents a machine designed by the E. W. Bliss Company for doing this work automatically, thus requiring but one man to do the work, who need not be a skilled shearman.

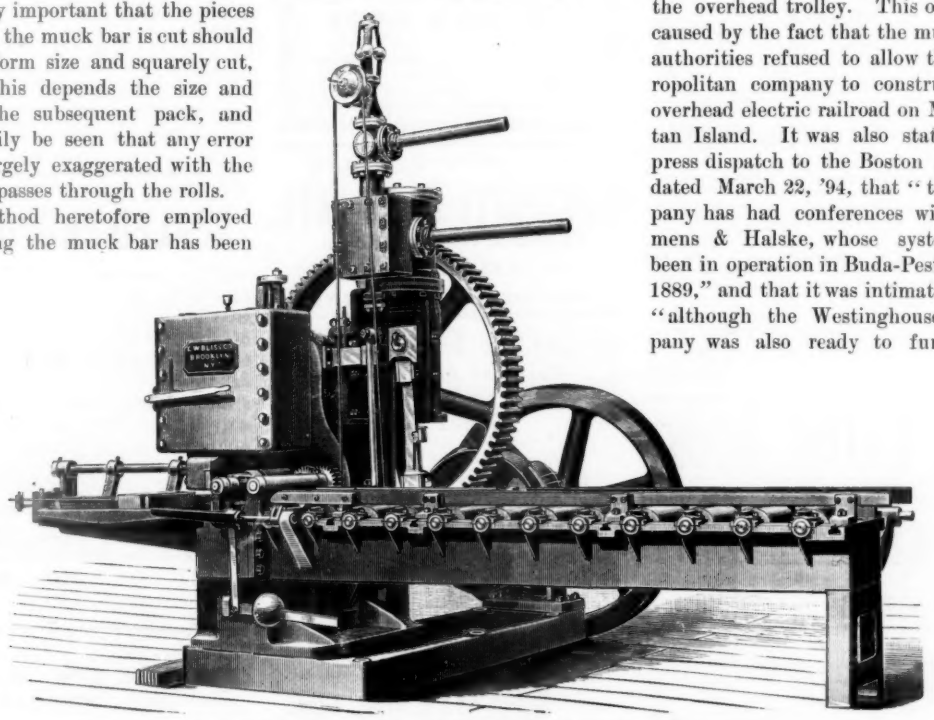
The machine consists of a powerful gate shear driven directly by an engine. A clutch is attached to the engine shaft, which can be operated either by hand or automatically. To the right of the machine is a carrier composed of a train of rolls driven continuously.

The muck bar coming hot from the rolls is placed upon these carriers, which propel it toward the cutters between side gauges, which keep it in position at right angles to the shear blades. Just before entering between the cutters a pair of feed rolls take hold of the bar so as to feed it positively.

A clamping device is placed in the path of the bar and so arranged with a lever that the progress of the bar may be arrested by the operator. This lever also controls the feed rolls, so that when the clamps are in contact with the bar the rolls are removed from it and *vice versa*.

This arrangement gives the operator full control over the bar, and he is enabled to bring it into proper position to square off the ragged end by throwing the clutch into operation by means of the hand lever shown in cut at the front of the cutter housing.

When the forward end of the bar has been squared, the operator raises the clamp lever and the bar feeds forward. An adjustable gauge is placed in its path, and upon striking this its progress is arrested and the clutch is automatically thrown into operation, causing the upper shear blade to descend and cut off the first length. As soon as this occurs the piece drops out, the shear blade ascends to its upper position and stops, while the bar again feeds forward and the operation is repeated until the bar is all cut to lengths. By this system the bars are cut accurately and as rapidly as they come from the rolls.



THE E. W. BLISS COMPANY'S AUTOMATIC MUCK BAR SHEAR.

In order to adapt the machine to the practical requirements of mill work, experiments were conducted for sometime by the makers at the mills of the Canonsburgh Iron and Steel Company, and this machine is the outcome of these experiments.

There are several of these machines in operation, and they are performing every duty required of them to the complete satisfaction of the parties using them.

Any further details or information may be obtained of the makers by addressing them at 133 Plymouth street, Brooklyn, N. Y.

A Question About The Siemens & Halske Conduit System.

TO THE EDITOR OF ELECTRICAL REVIEW:

Having lately been called upon to examine several plans for underground electric railroads, and especially such as employ methods analogous to the often mentioned Buda-Pesth installations, constructed by the firm of Siemens & Halske, of Berlin, I have found some published statements concerning which I shall be obliged to you, or any readers of your valued journal, for such elucidation as may be had on the subject.

About the middle of March, 1894, a number of the leading American dailies published the news that the Metropolitan Traction Company, of New York, had decided to equip one of its numerous lines with a view of eventually substituting this form of motive power for horses on most of its lines, should it prove satisfactory. In order to expedite matters, the company offered a prize of $50,000 to any inventor who would be able to furnish to the company a system superior to the overhead trolley. This offer was caused by the fact that the municipal authorities refused to allow the Metropolitan company to construct any overhead electric railroad on Manhattan Island. It was also stated in a press dispatch to the Boston *Herald*, dated March 22, '94, that "the company has had conferences with Siemens & Halske, whose system has been in operation in Buda-Pesth since 1889," and that it was intimated that, "although the Westinghouse Company was also ready to furnish a conduit system very similar to that used in Buda-Pesth, that the latter system would probably stand a better chance of being adopted."

Among the reasons adduced in favor of the Buda-Pesth conduit road is the fact that its operating expense during the six months ending June, 1892, was 40.8 per cent of the receipts, while the horse car lines controlled by the Metropolitan Traction Company cost about 60 per cent of the gross receipts to operate them.

I now desire to respectfully refer you to an article published in the ELECTRICAL REVIEW, July 29, 1893, from one of its London correspondents with reference to the appointment of a Joint Parliamentary Committee of the House of Commons and House of Lords to inquire into the working of electric tramways to determine whether the partial use of the earth as a return should be prohibited or restricted. Among the witnesses in favor of, or against the use of the earth as a return conductor, I find that Mr. J. Swinburne appeared. In his testimony he states as follows: "The slot system, as used in Buda-Pesth, would be impossible in this country (England) on account of the complications of crossings and the size of the culvert required; it would, perhaps, be possible to adopt a similar method with a slot of less width, but there again was the difficulty and complication experienced at the blanks, etc."

The second alleged advantage consisted in the fact that the Siemens & Halske conduit can be placed either between the rails, like those of the cable road, or, if desired, in the case of double track lines, between the two tracks, so that one yoke answers for both conduits.

Before coming to the question I want to ask, it may be of interest to state that the financial results of the Buda-Pesth road during the year 1892-3 are indeed encouraging. At the last annual meeting of that company the report of the treasurer shows that the total operating expenses amounted to 441,744 florins, while the receipts netted 975,961 florins, *i. e.*, a surplus of 534,221 florins, or $229,715. An eight per cent dividend was declared.

Mr. Swinburne was followed by Mr. Alex. Siemens, who not only confirmed the statements of the previous witness as to the difficulties of laying down in England the slot system, as used in Buda-Pesth, but he also stated that to install it it would necessitate an expenditure of half as much again as in Buda-Pesth. He had tried to introduce it at Bradford, but it was *impossible* to lay it down in *large* towns, and this, Mr. Editor, brings me to the point about which I desire to get more information.

On the one hand, it appears that the agents of Siemens & Halske have offered the use of the Buda-Pesth system to the Metropolitan company, of New York, as the most perfect and efficient underground system extant, which would fully answer all requirements. On the other hand, Mr. Alex. Siemens, of England, as late as the Summer of 1893, stated before the Joint Committee of the House of Commons and the House of Lords that he had tried to introduce the Buda-Pesth system at Bradford, found it impossible, and that it would be impossible to lay it down in large towns.

The question naturally arises: "Were the New York agents of Siemens & Halske authorized by their firm to offer the Buda-Pesth system to the Metropolitan Traction Company as a system which would fully meet the requirements of a great city like New York, when Alex. Siemens affirms that it would be impossible to lay it down even in large towns?"

If any one of the readers of the ELECTRICAL REVIEW will throw some light upon what appears to me a glaring discrepancy between Siemens and Siemens, I, for one, shall be thankful for such information.

Yours respectfully,

VICTOR M. BERTHOLD.

Cambridge, May 7.

KINDRED INTERESTS

J. Bradford Sargent, Boston, Mass., agent for the Stirling water tube boilers, has removed from 620 Atlantic avenue to 8 Oliver street.

The Stanley Electric Manufacturing Company, of Pittsfield, Mass., has secured land on which a new three-story brick factory will be erected.

The American Tube Works, 79 State street, Boston, Mass., have issued an interesting booklet on seamless drawn brass and copper tubing. It may be had for the asking.

Chas. A. Schieren & Company, 47 Ferry street, New York, have just taken an order from the Brooklyn City Railroad Company, Brooklyn, N. Y., for an extra belt 91 feet long and 60 inches wide.

The Electric Storage Battery Company, of Philadelphia, has opened a New York office in the Aldrich Court building, 45 Broadway, where cells of the chloride accumulator type may be seen by those interested.

Chas. A. Schieren & Company, New York, manufacturers of perforated electric leather belting, have issued a new pamphlet showing illustrations of a number of the large belts they have made and giving some interesting information about belts generally.

The General Electric Launch Company, of Morris Heights, New York, sold four of their launches last week: One to Lord Aberdeen, Governor General of Canada, for use at Ottawa; two to A. Meinecke, Jr., of Milwaukee; and one to the Altoona and Logan Valley Railroad Company for use at Altoona.

The E. W. Bliss Company, of Brooklyn, N. Y., have removed their Chicago office from 14 North Canal street to more commodious quarters at 100, 102 and 104 West Washington street, near Desplaines street. This office is still in charge of Mr. C. W. Ellsworth, who will be glad to see any of the E. W. Bliss Company's friends and patrons.

The Berlin Iron Bridge Company paid on April 14 their regular quarterly dividend of 1½ per cent. Considering the hard times in all branches of business, especially among manufacturers of structural iron, we think this shows pretty good management, not to put it any stronger, and is a refreshing change in reports coming from so many quarters of closed factories and "passed" dividends.

The Arkansas Electric Supply Company, Little Rock, Ark., has been reorganized. The new organization is known as the Brown Electric and Machine Company. The stockholders and officers are: J. T. Brown, president; W. G. Brown, vice-president; R. S. Buck, secretary and treasurer, and T. L. Bryan. F. K. Farsett is superintendent. The new company, as did the old, will carry on the business of establishing electric plants and the sale of appliances of all kinds, and will also handle machinery of all kinds and add greatly to the efficiency of their workshop.

The New Terminal facilities for the New York, New Haven and Hartford Railroad, at Providence, R. I., will necessitate two large bridges, which will be furnished by the Berlin Iron Bridge Company, of East Berlin, Conn. These bridges will carry 16 tracks over Gaspee street, Promenade street and Woonasquatucket River. The bridges will be plate girders resting on abutments at the street line and columns at the curb line. There will be no floor beams or stringers used, but in the place of these will be a metal floor supporting ballast in which the ties and rails will be bedded. The work will require about 4,500 tons of open hearth steel material. The Berlin company are to be allowed six months in which to complete the work. This company is also putting up a gas house extension for the Brookline Gas Company, at Allston, Mass.

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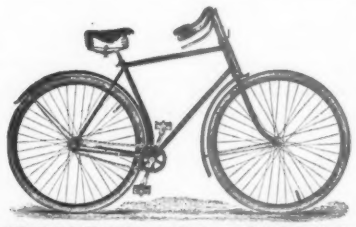

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